Vol. VIII. Number XXXVI.

NOTES
FROM THE
ROYAL BOTANIC GARDEN, EDINBURGH.

MARCH 1913.

CONTENTS.

Page

Plantae Chinenses Forrestianae:—

New Species of Celastraceae. (With Plates I–II). By Professor Dr. Theodor Loesener - - - 1

New Species of Pirolaceae. (With Plates III–V). By H. Andres - - - - - - - 7

New Species of Cyperaceae. By Oberpfarrer G. Kükenthal 9

New Species of Lespedeza. (With Plates VI–VIII). By Dr. A. K. Schindler - - - - - 11

New Species of Asclepiadaceae. By Dr. Rudolf Schlechter 15

Species of Orchideae. (With Plates IX–XII). By R. A. Rolfe - - - - - - - 19

New Species of Geranium. By Dr. R. Knuth - - 31

Species of Pedicularis. By Gustave Bonati - - 37

The Indigoferas of China. By W. G. Craib, M.A. - - 47

A New Disease on the Larch in Scotland. (With Plate XIII). By A. W. Borthwick, D.Sc., and Malcolm Wilson, D.Sc. - 79

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NOTES

FROM THE

ROYAL BOTANIC GARDEN, EDINBURGH.

VOL. VIII.

Including Numbers XXXVI–XL.

1913–1915.

With a Plan of the Garden,
Plates CXI–CXLVII, and One Figure in the Text.

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Number XL, pp. 293–356 for March 1915.

Corrections.

Plates I–XXVIII (with the corresponding references in the text) should be re-numbered CXI–CXXXVIII.

Page 220, line 25, *for* 17–19 *read* 34–38.

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List of Contents to Vol. VIII, 1913-1915.

PAGE
The Royal Botanic Garden i
List of Staff at March 1915 ii
Rules and Regulations iii
Historic Notice v
Regius Keepers ix
Principal Gardeners from 1756 x
Features of the Garden. With Key Plan xi
Teaching in the Garden xiii
Enumeration of Visitors, 1889–1914 xviii
Plantae Chinenses Forrestianae (plants discovered and collected by George Forrest during his first exploration of Yunnan and Eastern Tibet in the years 1904, 1905, 1906):—
Description of New Species of Celastraceae. With Plates CXI–CXII. By Professor Dr. Theodor Loesener . . 1
Description of New Species of Pirolaceae. With Plates CXIII–CXV. By H. Andres 7
Description of New Species of Cyperaceae. By Oberpfarrer G. Kükenthal 9
Description of New Species of Lespedeza. With Plates CXVI–CXVIII. By Dr. A. K. Schindler 11
Description of New Species of Asclepiadaceae. By Dr. Rudolf Schlechter 15
Enumeration and Description of Species of Orchideae. With Plates CXIX–CXXII. By R. A. Rolfe, A.L.S. . . 19
Description of New Species of Geranium. By Dr. R. Knuth . 31
Enumeration and Description of Species of Pedicularis. By Gustave Bonati 37
The Indigoferas of China. By W. G. Craib, M.A. 47
A New Disease on the Larch in Scotland. With Plate CXXIII. By A. W. Borthwick, D.Sc., and Malcolm Wilson, D.Sc., F.L.S. 79
Notes on the Japanese Primulas. With Plates CXXIV–CXXXV. By H. Takeda, D.I.C. 83
Cladrastis and Maackia. With Plates CXXXVI–CXXXVII. By H. Takeda, D.I.C. 95
Diagnoses specierum novarum chinensium in herbario Horti Regii Botanici Edinburgensis cognitarum. I–L . . . 105

PAGE

Propagation of Mutisia decurrens, Cav. With Plate CXXXVIII. By Laurence Baxter Stewart 137

Enumeration of Crassulaceae collected in China by Bullock, Carles, Ducloux, Forrest (second expedition), Hancock, Henry, Hosie, Hugh, Maire, Monbeig, Morse, Pratt, Wilson, with a Comparative Table, including the Species of Delavay and Forrest's first expedition. By Raymond Hamet . . 139

Notes on Chinese Labiatae. By Stephen Troyte Dunn, B.A., F.L.S., F.R.G.S. 153

Diagnoses specierum novarum in herbario Horti Regii Botanici Edinburgensis cognitarum. (Species chinenses.) LI–CII . 173

Three Indo-Burmese Rhododendrons. With Plates CXXXIX–CXLI. By J. H. Lace and W. W. Smith, M.A. . . 213

Puccinia Prostii, Moug., and Uromyces Scillarum, Wint.—Two Rust Fungi from the Royal Botanic Garden, Edinburgh. With Plates CXLII–CXLIII. By Malcolm Wilson, D.Sc., F.L.S. 219

Aeschynanthus chorisepala, Orr. A New Chinese Species; with an Account of Fissuring of its Leaves. With Plate CXLIV. By Matthew Young Orr 223

Ustilago Vaillantii, Tul. on Chionodoxa Luciliae, Boiss. With One Text-figure. By R. C. Davie, M.A., B.Sc., and Malcolm Wilson, D.Sc., F.L.S. 227

Some New Plants from Japanese Mountains. With Plate CXLV. By H. Takeda, D.I.C. 229

An Enumeration of the Chinese Astragali: with Descriptions of New Species. By N. Douglas Simpson, B.A., F.R.M.S. . 239

Contributions to the Knowledge of the Asiatic Polypodiums, with special reference to the Chinese Species. With an Appendix of the Chinese and Japanese Species in the Herbarium of the Royal Botanic Garden, Edinburgh. By H. Takeda, D.I.C. 265

Diagnoses specierum novarum in herbario Horti Regii Botanici Edinburgensis cognitarum. CIII–CL 313

Moultonia, a New Genus of the Gesneraceae from Borneo. With Plates CXLVI–CXLVII. By Professor Bayley Balfour, F.R.S., and W. W. Smith, M.A. 349

Plantae Chinenses Forrestianae.

Plants discovered and collected by George Forrest during his first exploration of Yunnan and Eastern Tibet in the years 1904, 1905, 1906.

Description of New Species of Celastraceae.

BY

PROFESSOR DR. THEODOR LOESENER,
Berlin.

With Plates I–II.

Euonymus roseoperulata, Loes. Sp. nov. dubia.

Frutex glaberrimus, 2–4–metralis; ramulis i.s. ± striato-sulcatis, vetustioribus cortice obscure brunneo-griseo sub lente longitudinaliter rimuloso ceterum laevi et nitidulo obtectis, hornotinis vix 1 mm. crassis; perulis inferioribus brevioribus subsemiorbicularibus margine scariosis apiceque saepius incisulis, superioribus longioribus spathulatis apice acutiusculis, usque 13 mm. longis et paene 5 mm. latis, integris omnibus i.s. pallide roseis; foliis oppositis, persistentibus, etsi chartaceis vel tantum tenuiter chartaceis submembranaceis, tenuiter et 4–8 mm. longe petiolatis, ellipticis vel lanceolato-ellipticis, basi cuneatis vel cuneato-obtusis, apice obtusiuscule vel acutiuscule acuminatis vel rarius subacutis, margine dense serrulatis, 4.5–7.5 cm. longis, 1.3–2.3 cm. latis, i.s. griseo-olivaceis, subtus vix pallidioribus, costa et nervis lateralibus supra i.s. prominulis, subtus costa prominula, nervis obsoletis, reticulo supra tenuiter prominulo, subtus plane evanido; inflorescentiis iuvenilibus singulatim lateralibus vel in foliorum axillis solitariis, gracilibus, bis vel ter dichotome furcatis, bracteis sublinearibus, acutis, usque paene 3 mm. longis, i.s. ± roseis, axibus intermediis evolutis; florum tantum alabastris valde iuvenilibus visis, 4–meris.

" Shrub of 6–12 ft. Flowers green. Thickets in side valleys on the eastern flank of the Tali Range. Lat. 25° 40′ N. Alt. 8000–9000 ft. May–June 1906." G. Forrest. No. 4756.

Species inter sempervirentes perulis manifestis roseis insignis proxima videtur *E. vaganti,* Wall., speciei himalaicae, quae draeter perulas multo minores et prius deciduas foliis manifeste latioribus recedit.

Euonymus cornutoides, Loes. Sp. nov.

Frutex glaber 2–4–metralis ; ramulis patentibus vel erectis, gracilibus, hornotinis 0·5–1·5 mm. crassis, i.s. longitudinaliter paucistriatis ; foliis oppositis, breviter (2–3 mm. longe) petiolatis, membranaceis vel tenuiter chartaceis, persistentibus (certe paucis postremis), anguste lanceolatis vel angustissime lanceolato-ellipticis, basi acutis vel raro subobtusis, apice sensim angustatis et in acumen acutum circ. 2 cm. longum vix conspicue a laminae parte reliqua distinctum productis, margine levissime subcrenulato-serrulatis, 4.5–10 cm. longis, 0.6–1.5 cm. latis, i.s. olivaceo-viridibus vel scilicet persistentibus ± cinerascentibus, subtus pallidioribus, costa media supra conspicua vel in vetustioribus prominula, subtus prominula vel prominente, nervis lateralibus brevibus, conspicuis vel obsoletis, in fol. vetustioribus subtus prominulis, reticulo obsoleto ; inflorescentiis singulatim lateralibus, gracilibus, semel vel plerumque bis dichotome furcatis, 3–7–floris et plerumque praeterea axibus accessoriis utrinque singulis unifloris auctis ideoque circ. 9–floris, rarissime tantum unifloris, pedunculis tenuibus, 2–4.5 cm. longis, axibus intermediis evolutis, 0.5–1 cm. longis, pedicellis 0.5–1 cm. longis, bracteis et prophyllis lapsis ; floribus mediocribus, 4–meris, expansis 5–7 mm. diam. ; calycis lobis rotundatis subsemiorbicularibus, vix 1 mm. longis et paene 2 mm. latis ; petalis i.v. viridulis, ovato-subrhombeis, apice obtusis, sub lente valida in facie superiore dense papillosis, circ. 4 mm. longis et 3 mm. latis ; staminibus supra discum carnosum 4–lobum in eius lobis insertis, filamentis brevissimis gibberiformibus, antheris subsessilibus rima transversali superne dehiscentibus, mox delapsis ; ovario depresso-pyramidato, 4–angulato, stigmate capitato sessili coronato, 4–loculari, loculis 2–ovulatis, ovulis ex angulo ventrali pendulis collateralibus.

" Shrub of 6–10 ft. Flowers livid green. Shady situations in mixed forests on the eastern flank of the Lichiang Range. Lat. 27° 25′ N. Alt. 10,000–11,000 ft. October 1906." G. Forrest. No. 3094.

Proxima *E. cornutae,* Hemsl., quae inflorescentiis 1–3–floris, raro usque 7–floris, axibus secundariis accessoriis nullis, floribus manifeste maioribus differt.

Euonymus porphyrea, Loes. Sp. nov. Plate i.

Frutex glaber ; ramulis patentibus alteris elongatis, laevibus, longitudinaliter sulcatis, alteris abbreviatis et foliorum lapsorum cicatricibus exasperatis, hornotinis 1–2 mm. crassis; foliis oppositis, 3–7 mm. longe petiolatis, deciduis, membranaceis, ovatis usque oblongis, basi cuneato-obtusis vel obtusis, raro subrotundatis vel cuneatis, apice manifeste et acute acuminatis, acumine usque 18 mm. longo, margine dense ciliato-serrulatis, 3.5–7.8 cm. longis, 1.2–2.6 cm. latis, i.s. olivaceo-viridibus, subtus paullo pallidioribus, costa media i.s. supra vix prominula, subtus prominula, nervis lateralibus tantum conspicuis, supra obsoletioribus vel plane obsoletis; inflorescentiis singulatim lateralibus vel in foliorum axillis solitariis, gracilibus, laxis longissimeque pedunculatis, semel vel bis dichotome furcatis, 2–7–floris, vel saepe axibus accessoriis utrinque singulis unifloris auctis usque 9–floris, pedunculis usque 5.5 cm. longis, axibus intermediis manifestis usque 2.3 cm. longis, pedicellis usque 1.3 cm. longis, bracteis et prophyllis filiformibus, mox deciduis; floribus mediocribus, 4–meris, explanatis 7–8 mm. diam.; calycis explanati lobis rotundatis ovatis vel subsemiorbicularibus, circ. 1 mm. longis; petalis ovato-oblongis ad apicem versus angustatis obtusiusculis vel subacutis, in vivo atropurpureis, circ. 4.5 mm. longis, 2–2.25 mm. latis; staminibus supra discum explanatum crassiuscule carnosum, 4–lobum in eius lobis insertis, filamentis brevissimis gibberiformibus, antheris subsessilibus, rima transversali superne dehiscentibus; ovario depresso-pyramidato et obsolete 4–gono, stigmate capitato sessili coronato, 4–loculari, loculis 2–ovulatis, ovulis collateralibus ex angulo centrali pendulis.

"Shrub of 10–15 ft. Flowers deep black-crimson. Open, rocky situations in side valleys on the eastern flank of the Lichiang Range. Lat. 27° 12′ N. Alt. 10,000 ft. May 1906." G. Forrest. No. 2240.

Species valde affinis *E. sanguineae,* Loes., quae differt foliis plerumque latioribus et brevius acuminatis, petalis pallidis, obtusioribus, rotundioribus.

Ad eandem hanc speciem mihi pertinere videntur specimina Wilsoniana n. 967, 967*a*, 3108, 3109, 3110, 3328.

Euonymus taliensis, Loes. Sp. vel var. nov.

Frutex glaber; ramulis patentibus, alteris elongatis, alteris abbreviatis, hornotinis 1–1.5 mm. crassis; foliis oppositis 4–6 mm. longe petiolatis, deciduis, membranaceis, oblongo-ellipticis vel ellipticis vel oblongis vel lanceolatis, basi obtusis vel cuneato-obtusis, apice sensim acuminatis vel subacutis, margine crenulato-serrulatis, 4.5–8 cm. longis, 1.4–2.5 cm. latis, i.s. olivaceis, subtus paullulo pallidioribus, costa et nervis lateralibus supra vix prominulis, conspicuis, subtus costa prominula, nervis tantum conspicuis vel etiam ± impressis, reticulo obsoleto; inflorescentiis singulatim lateralibus gracilibus, semel vel bis, rarius ter, dichotomis, axibus filiformibus, intermediis manifestis, pedunculis 2–4 cm. longis, pedicellis 1–1.4 cm. longis; floribus inter minores, 4–meris, expansis 4–6 mm. diam., calycis explanati lobis rotundatis, latioribus quam longioribus, circ. 0.5 mm. longis; petalis suborbicularibus circ. 2.5 mm. diam.; staminibus supra discum explanatum subtenuem obsoleteque 4–lobum in eius lobis insertis, filamentis brevissimis gibberiformibus, antheris subsessilibus, subreniformibus, rimis transversalibus superne et extrorsum dehiscentibus; ovario depresso-pyramidato, 4–gono, stigmate capitato sessili coronato, 4–loculari, loculis 2–ovulatis, ovulis ex apice et angulo centrali collateralibus et oblique pendulis.

"Shrub of 4–8 ft. Open, rocky situations amongst scrub on the eastern flank of the Tali Range. Lat. 25° 40′ N. Alt. 8000–9000 ft. June-July 1906." G. Forrest. No. 4798 partly.

Proxima *E. Giraldii*, Loes., quae foliis densius serrulatis, plerumque ± ciliato-serrulatis et latioribus recedit, atque forsan tantum varietas huius speciei.

This species was confused by Franchet with 4798*a*, both considered by him to be his *E. amygdalifolia*. It differs from the plant 4798*a*, to which we restrict Franchet's name, by the flowering branchlets being shorter, the flowers considerably smaller and of a paler colour.

Tripterygium Forrestii, Loes. Sp. nov. Plate ii.

Frutex 0.6–1.5 m. altus; ramulis acute angulatis et lenticelloso-verrucosis; foliis alternis 4.5–7 mm. longe petiolatis, ovalibus vel ovatis, basi cuneato-obtusis vel rotundatis, apice obtuse vel acutiuscule breviter vel usque 12 mm. longe acuminatis, margine crenulato-serrulatis, chartaceis vel tenuiter chartaceis, petiolo sub lente parce puberulo glabrescente excepto glabris vel glaberrimis, 5–8.5 cm. longis, 2.5–5.2 cm. latis, costa et nervis lateralibus ± patentibus et ad apicem versus arcuatis supra prominulis, subtus prominentibus, manifeste et dense reticulatis, reticulo supra tenuiter prominulo, subtus subprominente, inflorescentiis paniculam compositam terminalem usque 13 cm. longam formantibus, rhachi et axibus reliquis dense subfusco- vel griseo-puberulis; floribus parvulis, sub anthesi 4–5 mm. diam., gynaeceo 3–mero excepto 5–meris; calyce sub lente parce pulvereo-puberulo, lobis rotundatis sub lente ± repandulis, vix 1 mm. longis, circ. 1.25 mm. latis; petalis e basi paullum angustata subovatis, margine sub lente vix conspicue repandulis subintegris, circ. 2 mm. longis et 1.75 mm. latis; staminibus in disci crassiuscule carnosi, explanati, obsolete 5–lobi margine inter lobos insertis, quam petala brevioribus, filamentis subulatis, antheris late cordiformibus versatilibus, thecis extrinsecus granulatis ; ovario subtetraedrico manifeste 3–costato, 3–loculari, loculis 2–ovulatis, ovulis erectis, stylo sub anthesi ovario vix longiore, apice paullulum incrassato, stigmatibus 3 non vel vix 2–lobulatis ; fructibus immaturis 3–alatis.

" Shrub of 2–4 ft. Flowers greenish brown. Open, scrubby situations on the eastern flank of the Tali Range. Lat. 25° 40′ N. Alt. 9000–10,000 ft. August 1906." G. Forrest. No. 4290.

Genus usque adhuc ex Forb. et Hemsl. Ind. Flor. Sin. I. 125 monotypicum in species complures dividendum mihi nunc videtur. Species haece nova a *T. Wilfordii*, Hook. f. ex specimine Formosano descripto " glaberrimo " praecipue indumento inflorescentiae recedit. Reliquae species partim foliorum nervatura, partim florum magnitudine vel inflorescentiae indumento, partim stigmatum numero inter sese diversae sunt.

LIST OF PLATES

Illustrating Professor Loesener's Paper on Celastraceae collected by George Forrest in Yunnan.

The plates are taken from photographs by Mr. R. Adam of dried specimens in the Herbarium of the Royal Botanic Garden, Edinburgh.

PLATE I. Euonymus porphyrea, Loes. Sp. nov.
II. Tripterygium Forrestii, Loes. Sp. nov.

Lat. 27° 12' N
Alt. 10,000 feet
No. 2241
May 1906
Evonymus porphyreatus
n. sp.

EUONYMUS PORPHYREA. LOESENER.

TRIPTERYGIUM FORRESTII, LOESENER.

Plantae Chinenses Forrestianae.

Plants discovered and collected by George Forrest during his first exploration of Yunnan and Eastern Tibet in the years 1904, 1905, and 1906.

Description of New Species of Pirolaceae.

BY

H. ANDRES,
Bonn.

With Plates III–V.

Pirola decorata, Andres. Sp. nov. Plate iii.

Planta 15–35 cm. longa. Squamae anguste lanceolatae, longe acuminatae. Folia longe elliptica vel spathulata, apice rotundata, remote dentata, sensim in petiolum angustata, supra saturate viridia, nervis pallidioribus luteolis notata, subtus pallidiora, plerumque fuscescentia vel purpurascentia. Inflorescentia fere pyramidalis, 5–8–flora. Bracteae anguste lineares, pedicello longiores, plerumque accumbentes; pedicelli oblique erecti. Flores nutantes, late campanulati, ampli. Sepala lanceolata, subito rotundata vel sensim acuta, petala dimidia aequantia vel superantia, margine pallidiora. Petala ovata, 8–10 mm. longa, 4–5 mm. lata, viridulo-lutea. Staminum filamenta plana sursum curvata, antherae ovatae vel oblongo-rotundatae, basi saepe breviter apiculatae. Stylus plus minusve ex corolla exsertus, primo deorsum versus, dein subrectus; stigma quam stylus vix latius.

"Plant of 9–15 inches. Flowers yellowish. Dry situations in pine forests around and north of Lu-chang, Salwin valley, Salwin-Irrawadi divide. Lat. 26° 10′ N. Alt. 6000–9000 ft. November 1905." G. Forrest. No. 802.

"Plant of 6–12 inches. Flowers pale greenish-white. Amongst dwarf scrub and undergrowth in pine forests on the eastern flank of the Lichiang Range. Lat. 27° 10′ N. Alt. 9000–10,000 ft. July 1906." G. Forrest. No. 2519.

"Plant of 6–8 inches. Flowers greenish-white, veined green. Open, dry situations amongst pine scrub on the eastern flank of the Tali Range. Lat. 25° 40′ N. Alt. 9000–10,000 ft. July 1906." G. Forrest. No. 4176.

[Notes, R.B.G., Edin., No. XXXVI, March 1913.]

Resembles *P. picta*, Sm., in foliage, but shows few relations to it in other respects.

Pirola sororia, Andres. Sp. nov. Plate iv.

Caules ad 15 cm. alti. Squamae lanceolatae acutae. Folia fere orbicularia, nonnunquam subreniformia vel ovata, acuminata, circ. 2.5–3 cm. longa, 3–2.5 cm. lata, margine recurva, robusta, sicca luteo-viridia, nervi prominentes in dentes excurrentes; petiolus lamina dimidio brevior, alatus. Scapus erectus strictus, atrofuscus, squamis 1–3 late ovatis rotundatis praeditus. Racemus cylindricus, 8–11-florus; pedicelli horizontales; bracteae linguiformes, pedicello longiores. Flores nutantes, late campanulati. Sepala triangulari-ovata, acuminata, petalorum tertiam partem subaequantia. Petala late ovata suborbicularia basin versus angustata, 7–8 mm. longa 5–6 mm. lata, luteo-viridia venis obscuris notata. Staminum filamenta sursum curvata, antherae oblongae, cornutae, basi saepe mucronatae. Stylus exsertus, primo deorsum demum sursus curvatus; stigma amplum 5-crenatum. Capsula sepalis longior.

"Plant of 6–8 inches. Flowers greenish-yellow. In pine forests and cane brakes on the Mekong-Salwin divide west of Tsekou. Lat. 28° N. Alt. 11,000 ft. July 1904. S.E. Tibet." G. Forrest. No. 5065.

In appearance like our *P. media*, Sw., and *P. rotundifolia*, Linn., but distinguished by style, shape of sepals and petals, and the greenish-yellow colour of the petals.

Pirola Forrestiana, Andres. Sp. nov. Plate v.

A *P. rotundifolia*, Linn., notis compluribus diversa. Folia late ovata vel suborbicularia, crenata vel serrata. Bracteae oblongo-lanceolatae usque subovatae, rotundato-apiculatae, raro sensim acutatae, quam tertia vel dimidia pars petalorum sublongiores. Petala late ovata, 7–10 mm. longa, 5–7 mm. lata, luteolo-viridia extus rosea venis viridibus picta.

"Plant of 6–10 inches. Flowers greenish-white, tinged rose on exterior, veined green. Moist, shady, grassy situations in pine forests on the eastern flank of the Tali Range. Lat. 25° 40′ N. Alt. 10,000–11,000 ft. July–August 1906." G. Forrest. No. 4177.

Very closely allied to *P. rotundifolia*, Linn., but different in size and shape of the sepals and colour of the petals.

LIST OF PLATES

PLATE III. Pirola decorata, Andres. Sp. nov.
IV. Pirola sororia, Andres. Sp. nov.
V. Pirola Forrestiana, Andres. Sp. nov.

Pyrola decorata H. Andres.

PLANTS OF E. TIBET AND S.W. CHINA.
4176. COLLECTED BY GEORGE FORREST.
COLLECTOR FOR A. K. BULLEY of NESS, NESTON, CHESHIRE.
Pyrola rotundifolia. Linn.
Plant of 6-9 inches. Flowers
greenish-white veined green.
Open, dry situations amongst
pine scrub on the eastern
flank of the Tali Range.
Lat. 25° 40' N. Alt. 9-10,000 ft.
July 1906. W. Yunnan. China.

PIROLA DECORATA, H. ANDRES.

Pirola sororia H. Andres
Spec. nov.

PLANTS OF E. TIBET AND S.W. CHINA.
COLLECTED BY GEORGE FORREST
COLLECTOR FOR A. K. BULLEY of NESS, NESTON, CHESHIRE.

No 5065. Pyrola sp?

Plant of 6-8 inches flowers
greenish-yellow.
In pine forests and cane brakes
on the Mekong-Salween divide
west of Tsekou.
Lat. 28° N. Alt. 11,000 ft.
1904 [illegible]

PIROLA SORORIA, H. ANDRES.

Pirola Forrestiana H. Andres
spec. nov.

PIROLA FORRESTIANA, H. ANDRES.

Plantae Chinenses Forrestianae.

Plants discovered and collected by George Forrest during his first exploration of Yunnan and Eastern Tibet in the years 1904, 1905, and 1906.

Description of New Species of Cyperaceae.

BY

OBERPFARRER G. KÜKENTHAL,
Koburg.

Cobresia capillifolia (Decne.) C. B. Clarke, var. **condensata,** Kükenth. Var. nova.

Culmus rigidus fere obtusangulus. Spica composita densa. Nux oblonga longe rostrata.

"Plant of 9–14 inches. Stony, moist situations in the bed of a stream at the base of the eastern flank of the Lichiang Range. Lat. 27° 20′ N. Alt. 10,000–11,000 ft. June 1906. N.W. Yunnan." G. Forrest. No. 2473.

Carex Forrestii, Kükenth. Sp. nov.

Rhizoma stolones longos tenues sed lignosos agens. Culmus 15–25 cm. altus gracilis triqueter inferne foliatus. Folia culmum subaequantia 1½–2 mm. lata, plana sicca marginibus involuta, vaginae brunneae. Spiculae 3–4 parum remotae, terminalis ♂ lineari-cylindrica 2–2¾ cm. longa, laterales 2–3 ♀ ovatae vel oblongo-ovatae 8–12 mm. longae densiflorae sessiles, ima bractea brevi foliacea suffulta. Squamae ♀ oblongo-lanceolatae obtusiusculae atro-fuscae marginibus anguste albo-hyalinae viridi-carinatae. Utriculi squamis multo longiores latioresque perlate ovati 2½ mm. longi plano-convexi stramineo-virides dorso trinerves basi rotundata obconico-stipitati marginati rostro brevissimo marginibus subscabro ore albido truncato apiculati. Nux laxe inclusa. Stigmata 2.

E vicinia *C. Goodenoughii*, Gay, differt utriculis latis trinerviis marginatis ore incrassato nec non spiculis multo crassioribus.

"Plant of 7–12 inches. Moist, boggy situations in ditches in centre of Lichiang valley. Lat. 27° N. Alt. 8500 ft. May 1906. N.W. Yunnan." G. Forrest. No. 2088.

Carex Dielsiana, Kükenth. Sp. nov.

Dense caespitosa. Rhizoma breve lignosum. Culmi plures 25–50 cm. alti graciles trigoni laeves foliis remotis alte obsiti. Folia culmum subaequantia 2 mm. lata canaliculato-plana supra aspera rigida, vaginae brunneo-virides multinervosae, imae aphyllae. Spiculae 4–7 lineari-cylindricae 3–4 cm. longae androgynae (pars ♂ densiflora longior quam pars ♀ laxiflora), superiores plerumque binae inferiores singulae remotae longe pedunculatae saepe cernuae raro basi ramosae. Squamae ♂ oblongo-ovatae obtusae rufae viridi-carinatae marginibus late albo-hyalinae, ♀ interdum e carina aristulatae. Utriculi squamas longe superantes ellipsoidei obtuse trigoni 4 mm. longi stramineo-virides glabri plurinervosi, basi contracti in rostrum mediocre conicum ore hyalino oblique sectum excurvum subsensim abeuntes. Nux laxe inclusa trigona. Styli basis incrassata. Stigmata 3.

Ex affinitate *Carex Prainii*, C. B. Clarke.

"Plant of 9–12 inches. Grassy edges of cliffs on the eastern flank of the Lichiang Range. Lat. 27° 12′ N. Alt. 11,000–12,000 ft. May 1906. N.W. Yunnan." G. Forrest. No. 2141.

"Plant of 1–2 ft. Moist, shady, rocky situations in side valleys on the eastern flank of the Lichiang Range. Lat. 27° 12′ N. Alt. 10,500 ft. May 1906. N.W. Yunnan." G. Forrest. No. 2147.

Plantae Chinenses Forrestianae.

Plants discovered and collected by George Forrest during his first exploration of Yunnan and Eastern Tibet in the years 1904, 1905, and 1906.

Description of New Species of Lespedeza.

BY

DR. A. K. SCHINDLER,
Posen.

With Plates VI–VIII.

Lespedeza Balfouriana, Diels mss. ex Schindler in Fedde, Repertorium ix (1911), 522. (*Campylotropis.*) Plate vi.

Frutex 4–8-pedalis erectus ramis virgatis acute triquetris minute alatis pallide viridibus glabratis. Folia stipulis magnis semilanceolatis subscarioso-papyraceis pallidis multinervosis glabris 10–12 mm. longis 3 mm. latis angulis decurrentibus et petiolo late alato ad 6 cm. longo sparse pilosulo praedita, foliola papyracea elliptica vel late lanceolata apice acuta vel rotundata mucronata fere glabra subtus pallidiora nervis secundariis utrimque vix prominentibus, terminale petiolulatum 5–6 cm. longum lateralia subsessilia 4–5 cm. longa, omnia 1.5–2.3 cm. lata. Stipellae nullae. Racemi axillares et terminales paniculati saepe bini vel terni pedunculati, cum pedunculo 8–25 cm. longi; bracteae stipulis similes lanceolatae scariosae ad 5 mm. longae persistentes; pedicelli quam bracteae subduplo longiores adpresse pubescentes. Bracteolae lanceolatae acutae 1–1.5 mm. longae subpersistentes. Calyx sparse longeque adpresse brunneo-pubescens tubo 2.5 mm., laciniis superis 2–2.5 mm. infero 4–4.5 mm. longo acutis summa vix incisa. Corolla pallide lutea calyce duplo longior vexillo 9–10 mm. longo 6–7 mm. lato, alis 10–11 mm. longis 5 mm. latis, carina acutissima angulo fere acuto sursum curvata parte infera 9, supera 7 mm. longa. Legumen pedicello subduplo brevius oblique orbiculato-ovatum breviter mucronatum et stipitatum obsolete reticulatum brevissime sparse pilosulum cum stipite et mucrone 7–8 mm. longum et 4 mm. latum, mucrone 0.5, stipite 1.5–2 mm. longo.

"Shrub of 4–8 ft. Flowers pale canary-yellow. Moist, open, and shady situations amongst scrub, and on the margins of pine forests on the eastern flank of the Tali Range. Lat. 25° 40′. Alt. 8000–10,000 ft. June–September 1906." G. Forrest. No. 4241.

Lespedeza Feddeana, Schindler in Fedde, Repertorium x (1912), 405. Plate vii.

Suffrutex erectus ramosus, caule ramisque lineato-angulatis, breviter adpresse pubescentibus demum glabratis. Folia stipulis lineari-subulatis extus puberulis 4–5 mm. longis et petiolo superne sulcato pubescente ad 1 cm. longo praedita, rhachis brevis, semper distincta, dimidium petioli fere aequans; foliola lineari-elliptica vel oblonga, apice acutiuscula mucronata, marginibus subrevoluta, pallide viridia, superne glabra subtus longe denseque adpresse sericea; terminale ad 2.5 cm. longum et ad 6 mm. latum; lateralia paulo minora, nervis secundariis utrinque distinctis remotis subparallelis, arcubus latis connectis, reticulo inter nervos distincto; stipellas non vidi. Racemi florum perfectorum in foliorum superiorum axillis sessiles, glomerati vel pedunculati, elongati cum pedunculo ad 4.5 cm. longi. Bracteae lineares, primariae 1.2 mm. secundariae 2.5–3 mm. longae, calycis dimidium aequantes. Calyx 6–8 mm. longus, ad basin fere fissus, tubo 1 mm. tantum longo, laciniis lineari-subulatis, 2 posticis subbrevicribus 1.5 mm. alte connatis, antica longiore, longe denseque pilosis. Corolla ochroleuca cum macula violacea ad vexilli basin, calycem paullo tantum superans, vexillo alas et carinam paullo excedente, vexillo 8.5–9.5 mm. longo et 4.5–5 mm. lato, basi distincte appendiculo apice in apiculum parvum protracto, alis 7–8.2 mm. longis et 2 mm. latis rectis, carina 8–8.5 mm. longa et 2.5 mm. lata. Flores apetali in foliorum axillis sessiles glomerati, saepe ad basin pedunculi florum perfectorum. Legumen ignotum.

"Divide between Lang Kung and Chien Chuan valleys. Grassy hillsides. Lat. 26° 20′ N. Alt. 8000 ft. Yunnan. 1904." G. Forrest. No. 152.

Also Ki-mi-se, above Chiang yu, not far from Hochiang chou. Lat. 26° 32′ N. Long. 100° 9′ E. Delavay. No. 2740.

Very similar to *L. Gerardiana*, Grah., but differing in the branched stem, the linear bracts and bracteoles, the relation of the calyx to the corolla, the rhachis of the leaves, the pointed leaflets, and the nervation of the leaf; in *L. Gerardiana*, Grah., the secondary nerves are very close and no net of veinlets between them.

Lespedeza Forrestii, Schindler in Fedde, Repertorium x (1912), 406. Plate viii.

Herba suffrutescens vel suffrutex parvus e radice polycephala caules complures repentes simplices emittens, caules novelli dense longeque patenter villosi. Folia stipulis 2 fusco-membranaceis ad caulis basin latis ovatis acuminatis, apicem versus linearibus parallele nervosis demum reflexis extus villosis ad 6 mm. longis, et petiolo brevi villoso praedita, rhachi subnulla vel nulla; stipellas non vidi; foliola cuneato-oblonga, apice emarginata vel obtusa brevissime mucronata, superne glabra, subtus margineque laxe pubescentia, nervis secundariis tenellis utrinque subdistinctis, ad 20 mm. longa et ad 6 mm. lata. Flores in foliorum axillis subsolitarii (1–3), bracteae lineares 1–2 mm. longae, pedicelli pilosissimi 2 mm. longi, bracteolae lineares 2.5 mm. longae, extus longe pilosae. Calyx 8–9 mm. longus pilosissimus, profunde ultra dimidium fissus, tubo 2–2.5 mm. longo, laciniis lanceolatis longe acuminatis, posticis 5–5.5 mm. longis, 2–2.5 mm. alte connatis, lateralibus 6 mm., antica 6.5–7 mm. longis. Corolla calycem dimidio fere excedens, ex sicco pallide rosea cum macula violacea ad vexilli basin, vexillo 1–1.5 mm. longiore quam alis, his carinam 0.5–0.7 mm. excedentibus, vexillo late ovato apice retuso et minutissime apiculato, ad unguem appendiculo magno inflexo a latere occulto praedito, 10.5–12 mm. longo et 7.5–8 mm. lato, alis obtusis 9.5–11 mm. longis et 2.5 mm. latis, carina semiorbiculari obtusa, 9–10, 2 mm. longa et 3 mm lata ; ovarium longe pilosum stipitatum. Legumen ignotum.

" Plant of 2–6 inches. Flowers pale pink. Dry, stony, shady places in pine woods. Eastern flank of the Lichiang Range. Lat. 27° 12′. Long. 100° 14′. Alt. 9000–10,000 ft. June 1906." G. Forrest. No. 2416.

LIST OF PLATES

Illustrating Dr. A. K. Schindler's Paper on species of Lespedeza collected by George Forrest in Yunnan.

The plates are taken from photographs by Mr. R. Adam of dried specimens in the Herbarium of the Royal Botanic Garden, Edinburgh.

PLATE VI. Lespedeza Balfouriana (Diels mss.), Schindler. Sp. nov.
VII. Lespedeza Feddeana, Schindler. Sp. nov.
VIII. Lespedeza Forrestii, Schindler. Sp. nov.

LESPEDEZA BALFOURIANA, SCHINDLER.

PLATE VII.

LESPEDEZA FEDDEANA. SCHINDLER.

LESPEDEZA FORRESTII. SCHINDLER.

Plantae Chinenses Forrestianae.

Plants discovered and collected by George Forrest during his first exploration of Yunnan and Eastern Tibet in the years 1904, 1905, and 1906.

Description of New Species of Asclepiadaceae.

BY

DR. RUDOLF SCHLECHTER,
Berlin.

Periploca Forrestii, Schltr. Sp. nov. 10793

Frutex volubilis, scandens, bene ramosa, usque ad 2 m. alta; ramis ramulisque filiformibus, glabris, teretibus; foliis lanceolatis, acuminatis, basi cuneatis, brevissime petiolatis, 4–6 cm. longis, infra medium 0.7–1.3 cm. latis, utrinque glabris, textura coriaceis; cymis axillaribus, abbreviatis, paucifloris; bracteis deltoideis, minutis; floribus in genere inter minores; calycis segmentis late ovatis vel suborbicularibus, obtusis, glabris, vix 1.5 mm. longis; corolla subrotata alte 5-partita c. 0.5 cm. longa, lobis oblongis oblique subapiculatis, glabris, intus per medium leviter carinatis; coronae segmentis 5, subulatis, minute puberulis, corollae lobis paululo brevioribus, basi utrinque squamella parvula auctis, corollae supra basin affixis; antheris e basi dilatata subunguiculata angustatis, obovatis, connectivo in apiculum satis longum, puberulum producto; polliniis elliptico-spathulatis, glandula semilunata parvula; stigmatis capite breviter conico gibbis 5 medio circumdato.

"Semi-climbing shrub of 3–6 ft. Thickets on hills west of Yunnanfu. Elevation 8000 ft." G. Forrest. No. 572.

This species has evidently been always mistaken for *P. calophylla*, Falc. It is, however, well distinguished by the broader and glabrous corolla-segments and the corona-scales. The flowers, besides, are of much smaller size than in *P. calophylla*, Falc.

Cynanchum Forrestii, Schltr. Sp. nov.

Terrestre, erectum, simplex, usque ad 45 cm. altum; caule teretiusculo, basi glabrato, apicem versus puberulo, bene foliato;

[Notes, R.B.G., Edin., No. XXXVI, March 1913.]

foliis brevissime petiolatis, late ellipticis, breviter acuminatis, basi rotundatis vel subcordatis, subtus puberulis, praesertim nervis, superne glabratis, nervis exceptis, 3.5–6 cm. longis, medio fere 2.5–4.5 cm. latis; cymis pedunculatis, subumbelliformi-abbreviatis, usque ad 3.5 cm. longis, 10–15-floris; pedunculo puberulo usque ad 2 cm. longo; pedicellis gracilibus usque ad 1 cm. longis, puberulis; calycis segmentis lanceolato-triangulis subacutis, puberulis, margine ciliatis, corolla duplo brevioribus; corolla subrotata, alte 5-partita, 3.75 mm. longa; lobis oblongis obtusis, intus medio puberulis; gynostemio humili, corolla duplo breviore; corona alte 5-lobata, lobis ovato-lanceolatis obtusiuscule acuminatis, glabris, intus basi medio gibbo parvulo donatis, gynostemio subaequilongis; antheris oblongo-quadratis, marginibus cartilagineis basi dilatatis, approximatis, appendice hyalino suborbiculari, obtuso, in stigmatis caput apice incumbente; polliniis oblique oblongoideis, translatoribus brevibus horizontalibus retinaculo oblongoideo, polliniis submajore.

"Plant of 1–2 ft. Flowers greenish-orange. Dry, shady situations in pine forests on the eastern flank of the Tali Range. Lat. 25° 40′ N. Alt. 9000–10,500 ft. July 1906." G. Forrest. No. 4662.

Evidently No. 2241 from the Lichiang Range is a smaller form of this species. "Plant of 6–12 inches. Flowers greenish-orange. Amongst scrub and in dry, stony, open situations on the eastern flank of the Lichiang Range. Lat. 27° 20′ N. Alt. 9000–10,000 ft. May 1906." G. Forrest. No. 2241.

The plant is allied to *C. Arnottianum*, Wight, but is easily distinguished by the longer peduncles and pedicels. I place it next to it.

var. **Balfourianum,** Schltr. Var. nov.

Differt a forma typica, floribus ut videtur purpurascentibus, calycis segmentis lanceolatis, acutis, coronae lobis basi subangustatis.

"Plant of 9–18 inches. Flowers dark greenish-brown. Dry, rocky situations in pine forests on the eastern flank of the Lichiang Range. Lat. 27° 20′ N. Alt. 10,000–11,000 ft. May 1906." G. Forrest. No. 2216.

I regard this plant for the present as a variety of *C. Forrestii*, Schltr., although I do not think it unlikely that later on it may prove to be a good species. The material at hand consists only of a single plant which does not allow any conclusion as to its variability. As is proved by the above quoted No. 2241, it seems, however, that *C. Forrestii*, Schltr., may be a rather variable species, which generally can be recognised by the very shortly petioled leaves with pubescent nerves on the upper side.

Tylophora yunnanensis, Schltr. Sp. nov.

Erecta, simplex vel subsimplex, apice subscandens, usque ad 50 cm. alta; caule tereti, minute puberulo, bene foliato, apicem versus subefoliato; foliis brevissime petiolatis ellipticis, obtusis, vulgo cum apiculo minuto, basi cuneatis, superne glabratis, subtus minute puberulis, 3–7.5 cm. longis, medio fere 1.2–3.2 cm. latis; cymis graciliter pedunculatis, laxe plurifloris, 3.5–5 cm. longis, pedunculo gracili, puberulo, usque ad 3.5 cm. longo; pedicellis filiformibus, puberulis 0.7–0.9 cm. longis; calycis laciniis lanceolato-triangulis, obtusiusculis, dorso sparsim pilosulis, margine sparsim ciliatis, 1.25 mm. longis; corolla rotata, alte 5-partita, 2.5–3 mm. longa, lobis oblongis, obtusis, margine minute ciliatis, extus glabris, intus tenuissime pilosulis; gynostemio humili, parvulo; coronae squamis dorso filamentorum omnino adnatis, gibbiformibus, triangulis, obtusis, basi truncatis, basin antherarum haud superantibus; antheris quadratis, appendice hyalino subreniformi, obtusissimo, apice in stigmatis caput incumbente; polliniis oblongoideis, horizontaliter patentibus, translatoribus perbrevibus, retinaculo oblongoideo-quadrato, minuto, polliniis fere 6-plo minoribus.

"Semi-scandent plant of 1–2 ft. Flowers livid greenish-crimson. Dry, rocky, open situation in pine forests on the foothills of the Lichiang Range. Lat. 27° N. Alt. 9000 ft. July 1906." G. Forrest. No. 2567.

"Plant of 1–2 ft. Flowers purplish-green. Amongst shrubs and grasses on the eastern flank of the Tali Range. Lat. 25° 40′ N. Alt. 8000–9000 ft. June–July 1906." G. Forrest. No. 4661.

The species is somewhat allied to the Himalayan *T. Govani*, Hook. f.

Ceropegia dolichophylla, Schltr. Sp. nov.

Terrestris, scandens, usque ad 1 m. et ultra; caule filiformi, tereti, glabrato, laxe foliato; foliis patentibus patulisve, lanceolatis vel lineari-lanceolatis, acuminatis, basi longe cuneatis, in petiolum breve sparsim puberulum angustatis, margine praesertim basi sparsim ciliatis, caeterum glabris, textura tenuibus 6–21 cm. longis, medio fere 0.8–1.8 cm. latis; cymis breviter pedunculatis, abbreviatis, pedunculo usque ad 1.7 cm. longo, sparsim puberulo vel subglabro; pedicellis glabratis, usque ad 1.5 cm. longis, glabris, calycis laciniis lineari-lanceolatis, acuminatis, glabris, usque ad 0.6 cm. longis; corolla omnino c. 2.5 cm. longa, extus glabra, e basi subgloboso-inflata vulgo obliqua, in tubum subcylindricum producta, lobis oblongo-ligulatis, obtusis, apice cohaerentibus, intus carinatis et sparsim puberulis, c. 1.4 cm. longis, tubo fere aequilongis, corona poculiformi, foliolis altius connatis, in dentes 2 triangulos obtusos, pilosulos productis, ligulis interioribus linearibus obtusis fere duplo longioribus, glabris; polliniis oblique oblongoideis, translatoribus brevibus, retinaculo anguste oblongoideo, polliniis paulo minore.

"Scandent plant of 1–3 ft. Flowers deep purplish-maroon and green. Root fleshy, and eaten by the hill tribes. On grass and dwarf scrub in dry, stony places on the eastern flank of the Tali Range. Lat. 25° 40′ N. Alt. 8000–9000 ft. July-August 1906." G. Forrest. No. 4738.

Dr. Henry's plant, No. 9490, from Mengtze, alt. 6000 ft., certainly belongs to the same species as Mr. Forrest's. By the long leaf one is at first reminded of *C. longifolia*, Wall., but the flowers are very different.

Ceropegia Balfouriana, Schltr. Sp. nov.

Terrestris, humilis, c. 12 cm. alta; radicibus fasciculatis, crassis; caulibus paucis, simplicibus, flexuosis, laxe foliatis, basi denudatis, teretiusculis, minute puberulis; foliis erecto-patentibus, ellipticis vel elliptico-lanceolatis, acutis vel breviter acuminatis, superne et petiolo minute puberulis, subtus nervo medio excepto glabratis, margine vulgo paulo undulatis, textura ut videtur crassiusculis, 0.9–2 cm. longis, medio vel infra medium 0.4–0.6 cm. latis; cymis subsessilibus paucifloris; pedicellis teretibus, sparsim puberulis, c. 1 cm. longis; calycis laciniis anguste lanceolatis, subulato-acuminatis, basi sparsim puberulis, c. 0.5 cm. longis; corolla c. 3 cm. longa, e basi subgloboso-inflata, in tubum subcylindricum, c. 4.5 mm. diametientem fauce paululo dilatatum producta, extus glabra, lobis oblongo-ligulatis, intus carina puberula donatis, tubo aequilongis, c. 1.2 cm. longis; corona poculiformi, foliolis alte connatis in lobos 2 pilosulos triangulos, acutos productis, ligulis interioribus anguste linearibus, apicem versus paululo dilatatis, obtusis, glabris, plus duplo longioribus; polliniis oblique ovalibus, translatoribus mediocribus, horizontalibus, retinaculo rhomboideo, polliniis fere 4-plo minore.

"Plant of 6 inches. Flowers purple and green. Rocky situations amongst scrub on the eastern flank of the Lichiang Range. Lat. 27° 10′ N. Alt. 9500 ft. May 1906." G. Forrest. No. 2204.

This species has outwardly a certain resemblance with *C. nana*, Coll. et Hemsl., but has much shorter flowers, more elliptical leaves, and a very different corona. It is dedicated to Professor Balfour.

Plantae Chinenses Forrestianae.

Plants discovered and collected by George Forrest during his first exploration of Yunnan and Eastern Tibet in the years 1904, 1905, and 1906.

Enumeration and Description of Species of Orchideae.*

BY

MR. R. A. ROLFE, A.L.S.,
Kew.

With Plates IX–XII.

Liparis Forrestii, Rolfe. Sp. nov.

Terrestris, 30–60 cm. alta. Caulis brevis, vaginis membranaceis laxis obtectus, monophyllus. Folia sessilia cordato-ovata, breviter acuminata, 7–nervia, membranacea, circiter 14 cm. longa, 7 cm. lata. Scapi erecti, 30–60 cm. longi, vaginis lanceolatis paucis obtecti; racemi laxi, multiflori. Bracteae lineari-lanceolatae, acuminatae, 5–8 mm. longae. Pedicelli circiter 1 cm. longi. Flores mediocres. Sepalum posticum lineari-lanceolatum, subobtusum, 8 mm. longum; sepala lateralia patentia, elliptico-oblonga, obtusa, 5–6 mm. longa. Petala linearia, subobtusa, 8 mm. longa. Labellum suborbiculare, subemarginatum, crenulatum, circiter 5 mm. longum, 6 mm. latum, crebre radiato-venosum, basi obtuse carinatum et minute bituberculatum. Columna oblonga, 2 mm. longa.

"Damp woods around Nam sa Ho. Elevation 7000 ft. Frontier of Upper Burmah and China (Shan States). Flowers green and yellow. July 1904." G. Forrest. No. 261.

An ally of the N. Indian *L. cordifolia*, Hook. f., but differing in its longer scape, relatively longer leaves, and broader lip.

Liparis longipes, Lindl. in Wall. Pl. Asiat. Rar. i, p. 31, t. 35; Hook. f. Fl. Brit. Ind. v, p. 703; Rolfe in I.F.S. iii, p. 7.

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* For other species of Orchideae see Paper by Dr. R. Schlechter in Notes, Roy. Bot. Gard., Edin., vol. v. p. 93.

[Notes, R.B.G., Edin., No. XXXVI, March 1913.]

"Plant of 1–2 ft. Flowers white. Shady situations, on dry rocks and branches of trees, valley of the Salwin, south of Chongwa. Lat. 26° 45′ N. Alt. 3000–4000 ft. Irrawadi-Salwin divide. N.W. Yunnan, November 1905." G. Forrest. No. 926.

"Plant of 1–2 ft. Flowers orange and dirty white. Faintly fragrant. Dry ledges of cliffs on the Salwin, near La-To-Wa-Di, Salwin-Irrawadi divide. Lat. 26° 35′ N. Alt. 3000 ft. N.W. Yunnan, November 1905." G. Forrest. No. 1032.

Oreorchis foliosa, Lindl. in Journ. Linn. Soc. iii, p. 27; Hook. f. Fl. Brit. Ind. v, p. 709; Rolfe in I.F.S. iii, p. 9.

"Valley of the Yangtze around Pung-tzu-la, and also on Mekong-Yangtze divide. Alt. from 6000–9000 ft. N.W. Yunnan, 1904." G. Forrest. No. 167.

"Mekong-Salwin divide, behind Tzekou Mission. Tibet, 1904." G. Forrest. No. 168.

Dendrobium Bulleyi, Rolfe. Sp. nov.

Caules fasciculati, erecti, elongati, subcylindrici, sulcati, foliosi, 20–30 cm. longi, vaginis nigro-hirsutis. Folia lanceolata vel subovato-lanceolata, brevissime et inaequaliter biloba, lobis obtusis, 3.5–5 cm. longa, coriacea. Racemi axillares et subterminales, brevissimi, 1–3-flori. Bracteae ovatae, acutae vel subacutae, striatae, concavae, imbricatae, nigro-hirsutae, 5–8 mm. longae. Pedicelli subgraciles, circiter 2 cm. longi. Flores magni, speciosi. Sepala subpatentia, posticum lanceolato-ellipticum, breviter acuminatum, circiter 1.7 cm. longum; sepala lateralia triangularia, breviter acuminata, basi 8 mm. lata. Petala elliptico-lanceolata, acuta, circiter 1.7 cm. longa. Labellum late obovatum, 2 cm. longum, 2.5 cm. latum, apice breviter trilobum; lobi laterales ampli, rotundati, crenulati; lobus intermedius brevis, latus, dentatus; discus tricarinatus, carinis prope apicem crenulatis; mentum conicum, acutum, 1.7 cm. longum. Columna lata, 4 mm. longa, alis rotundatis.

"Plant of 10–12 inches. Flowers—sepals and petals yellowish-white, labellum reddish-orange, veined darker. On dry shady banks in pine woods near Tien-Ching-pu on the Teng-Yueh—Talifu road. Lat. 25° 30′ N. Alt. 8000–9000 ft. W. Yunnan, September 1905." G. Forrest. No. 1091.

Nearly allied to the North Indian *D. longicornu*, Lindl., of which it may be regarded as the geographical representative, but differing in its less acuminate sepals and petals, broader, not fringed, lip, shorter mentum, and generally smaller leaves.

Dendrobium clavatum, Wall. Cat. n. 2004; Hook. f. Fl. Brit. Ind. v, p. 746; Rolfe in I.F.S. iii, p. 10.

"Plant of 12–18 inches. Flowers deep orange, fleshy, nonfragrant. Crevices of perpendicular cliffs, Mekong valley. Lat. 28° N. Alt. 5000–6000 ft. Yunnan, June 1905." G. Forrest. No. 1142.

Bulbophyllum tibeticum, Rolfe. Sp. nov. Plate ix.

Rhizoma repens, validum. Pseudobulbi anguste ovoideo-tetragoni, nitidi, 2.5–3 cm. longi, basi vaginis ovatis striatis obtecti. Folia oblonga, obtusa, breviter petiolata, coriacea, 6–11 cm. longa, 1.5–2 cm. lata. Scapi suberecti, subgraciles, 9–12 cm. longi, vaginis 2 tubulosis apice acutis obtecti, 2–3-flori. Bracteae elliptico-oblongae, subobtusae, concavae, 8–10 mm. longae. Pedicelli circiter 2 cm. longi. Sepalum posticum elliptico-ovatum, obtusum, concavum, integrum, 8–9 mm. longum; sepala lateralia subpatentia, obliqua et subfalcata, ovato-oblonga, apice subattenuata, subconcava, 1.3–1.5 cm. longa. Petala ovata, apice obtusa vel rotundata, integra, 5 mm. longa. Labellum recurvum, ovatum, obtusum, subcarnosum, 5 mm. longum, margine recurvo integro. Columna latissima, 3 mm. longa; dentes triangulares, subobtusi.

"On dry rocks, valley of the Mekong, between Bati and Tzekou. Alt. 6000 ft. Tibet, 1904." G. Forrest. No. 232.

Allied to *B. bicolor*, Lindl., but differing in the longer and narrower leaves, and some details in floral structure.

Cirrhopetalum amplifolium, Rolfe. Sp. nov. Plate x.

Rhizoma repens, validum. Pseudobulbi circiter 9 cm. distantes, ovoideo-oblongi, angulati, nitidi, 6–8 cm. longi, monophylli. Folia longe petiolata; limbus ellipticus vel elliptico-oblongus, subobtusus, 15–20 cm. longus, 7–8.5 cm. latus, coriaceus; petiolus 4–6 cm. longus. Scapi suberecti, validi, 15–30 cm. longi, vaginis 3–4 tubulosis obtecti. Flores umbellati, 4–8, speciosi. Bracteae lanceolatae vel oblongo-lanceolatae, acuminatae, subconcavae, 8–13 mm. longae. Pedicelli 1.5–2 cm. longi. Sepalum posticum ovatum, minutissime crenulatum, concavum, circiter 1 cm. longum, apice longe setiferum; seta 8 mm. longa, gracillima, flexuosa, apice longe clavata; sepala lateralia fere ad apicem connata, 4.5–5.5 cm. longa, apice breviter bidentata. Petala triangulari-ovata, longe pectinata, 4 mm. longa, apice longe setifera; seta 9 mm. longa, gracillima, flexuosa, apice longe clavata. Labellum recurvum, ovato-oblongum, obtusum, carnosum, circiter 6 mm. longum. Columna lata, 3 mm. longa; dentes falcato-incurvae, oblongae, apiculatae, 4 mm. longae.

"Erect plant (epiphyte) of 12–15 inches. Foliage one solitary leaf, thick, fleshy, and with a pseudo-bulb. Flowers, a pale yellowish-pink veined deep purple lake. Shady situations on trees on cliffs, banks of the Salwin, Salwin-Irrawadi divide, north of Ta-ko. Lat. 26° 30′ N. Alt. 3000 ft. N.W. Yunnan, November 1905." G. Forrest. Nos. 958, 970, 1117.

Allied to *C. picturatum*, Lodd., but having much broader leaves, larger flowers, and the setae of the petals and dorsal sepal much longer.

Cirrhopetalum emarginatum, Finet in Bull. Soc. Bot. Fr. xliv, p. 269, t. 8.

"Plant of 4–6 ft. Flowers lake and pale yellow, faintly fragrant. On dry trees in shady situations on the ascent of the Hsu-tzu-Ngai pass, Mekong-Salwin divide, Salwin valley. Lat. 27° 10′ N. Alt. 8000–9000 ft. N.W. Yunnan, November 1905." G. Forrest. No. 925.

Eria acervata, Lindl. in Journ. Hort. Soc. vi, pp. 57, 58, with fig.; Hook. f. Fl. Brit. Ind. v, p. 796.

"Rocks on banks of stream near Nam-sa-Ho frontier, Upper Burmah and China. Flowers pure white, perfumed. July 1904." G. Forrest. No. 176.

Spathoglottis pubescens, Lindl. Gen. and Sp. Orch. p. 120; Hook. f. Fl. Brit. Ind. v, p. 814; Rolfe in I.F. S. iii, p. 18.

S. Fortunei, Lindl. Bot. Reg. xxxi, t. 19.

"Limestone hills in the Yung-ping valley, Teng-Yueh to Talifu route; also divide between Hoching and Lichiang valleys. Sepals deep rich brown, petals yellow. Elevation 5000–7000 ft. Yunnan, August 1904." G. Forrest. No. 71.

Thunia venosa, Rolfe in Orch. Rev. 1905, p. 206.

Phaius albus, Hook. Bot. Mag. t. 3991 (not of Lindl.).

"Hill pastureland above Yung-ping valley, Teng-Yueh-Talifu route. Elevation 5000–6000 ft. Plant of 2–3 ft. Flowers rose and white. Yunnan, August 1904." G. Forrest. No. 266.

Anthogonium gracile, Lindl. Gen. and Sp. Orch. p. 426; Hook. f. Fl. Brit. Ind. v, p. 822; Rolfe in I.F.S. iii, p. 21.

"Plant of 1–2 ft. Flowers rose-red. Labellum purple. Dry mountain pastureland on eastern slopes of Tsan-Shan Range, west of Talifu. Lat. 25° 40′ N. Alt. 7000–8000 ft. W. Yunnan, September 1905." G. Forrest. No. 894.

Pleione praecox, Don, Prodr. p. 37; Rolfe in Orch. Rev. 1903, p. 290.

Coelogyne praecox, Lindl. Collect. Bot. p. 37; Hook. f. Fl. Brit. Ind. v, p. 840.

"Plant of 6–10 inches. Flowers rose-magenta, with deeper markings of the same. Epiphyte on trees, in moist, dense forest on the Irrawadi–Ming-Kwong divide, also in the Irrawadi basin. Lat. about 26° N. Alt. 6000–9000 ft. Upper Burmah and N.W. Yunnan, October 1905." G. Forrest. No. 851.

Pleione yunnanensis, Rolfe in Orch. Rev. 1903, p. 292.

Coelogyne yunnanensis, Rolfe in Journ. Linn. Soc. xxxvi, p. 23.

"Mekong-Salwin divide, N.W. of Tsekou. Alt. unknown. Tibet, 1904." G. Forrest. No. 265.

Cymbidium Forrestii, Rolfe. Sp. nov. Plate xi.

C. virescens, Schlechter in Notes, Roy. Bot. Gard., Edin., xxxiv, p. 112 (not of Lindl.).

Rhizoma validum. Folia fasciculata, 6–7, anguste linearia, acuta, minutissime denticulata, 30–40 cm. longa, 4–6 mm. lata, suberecta vel arcuata, basi vaginis ovatis striatis obtecti. Scapi erecti, subvalidi, 15–20 cm. longi, vaginis lanceolatis vel oblongo-lanceolatis acuminatis striatis numerosis imbricatis obtecti, 1–2-flori. Bracteae lanceolatae, acuminatae, concavae, 3–4 cm. longae. Pedicelli 1.5–2.5 cm. longi. Sepalum posticum oblongum, subobtusum, 2.5 cm. longum, 6 mm. latum; sepala lateralia oblonga, subobtusa, 2 cm. longa, 6 mm. lata. Petala oblonga, subobtusa, circiter 1.8 cm. longa, 6 mm. lata. Labellum trilobum, circiter 1.8 cm. longum, 1–1.2 cm. latum; lobi laterales semiorbiculares, apice rotundati, lobus intermedius suborbicularis, obtusus vel apiculatus, undulatus, concavus, 1 cm. longus, 7 mm. latus; callus obovatus, basi adnatus, apice bilobus. Columna clavata, arcuata, 2.3 cm. longa.

"In dry, rocky pine woods on hills west of Yunnanfu. Elevation 9000 ft. Yunnan, S.W. China, February 1905." G. Forrest. No. 415.

Closely resembling the Japanese *C. virescens*, Lindl., in habit, but markedly different in the shape of the lip and crest.

Cymbidium grandiflorum, Griff., Notul. iii, p. 342; Hook. f. Fl. Brit. Ind. vi, p. 12; Rolfe in I.F.S. iii, p. 30.

"Growing at China Inland Mission, Talifu. Alt. 6500 ft. Yunnan, 1904." G. Forrest. No. 240.

Cymbidium pumilum, Rolfe in Kew Bulletin, 1907, p. 130.

"Limestone valleys leading from the Chung Tien plateau to Pung-tzu-la on the Yangtze. Alt. 8000–9000 ft. N.W. Yunnan, 1904." G. Forrest. No. 233.

Sarcanthus filiformis, Lindl. Bot. Reg. 1842, Misc. p. 61; Hook. f. Fl. Brit. Ind. vi, p. 66.

"Damp rocks on sides of streams, Nam-sa-Ho frontier of Upper Burmah and China (Shan States). Flowers flesh-red. July 1904." G. Forrest. No. 161.

Spiranthes australis, Lindl. Bot. Reg. x, sub t. 823; Hook. f. Fl. Brit. Ind. vi, p. 102; Rolfe in I.F.S. iii, p. 41.

"Dry pastureland in most valleys at an elevation of from 5000–9000 ft. Flowers pink and white. Yunnan, September 1904." G. Forrest. No. 166.

Herminium yunnanense, Rolfe. Sp. nov.

Tuber ovoideum vel ovoideo-oblongum, 8–10 mm. longum. Caulis brevis, vaginis tubulosis obtectus, monophyllus. Folia sessilia, oblonga vel lineari-oblonga, acuta, suberecta, coriacea, 4.5–6 cm. longa, 4–5 mm. lata. Scapi erecti, 12–15 cm. longi, vaginis ovato-lanceolatis acuminatis paucis obtecti; racemi oblongi, densi, 4–5 cm. longi. Bracteae ovatae, acuminatae, 4 mm. longae, basi concavae. Pedicelli 3–4 mm. longi. Flores parvi Sepala subpatentia, ovata, subobtusa, concava, subaequalia, 2 mm. longa. Petala ovata, subacuta, concava, 1.5 mm. longa. Labellum oblongum, 2.3 mm. longum, apice tridentatum vel breviter trilobum, basi concavum. Columna lata, vix 1 mm. longa.

"Plant of 6–12 inches. Flowers greenish-yellow. Damp, barren moorland, western slopes of the Tsan-Shan Range, near the head of Yang-pi pass. Lat. 25° 40′ N. Alt. 9000–10,000 ft. W. Yunnan, September 1905." G. Forrest. No. 907.

Allied to *H. gramineum*, Lindl., which also has a solitary leaf, but the scape is straighter, the spike much more dense, and the lip not tridentate at the apex.

Gymnadenia conopsea, R.Br. in Ait. Hort. Kew. ed. 2, v, p. 191; Rolfe in I.F.S. iii, p. 52.

"Mekong-Salwin divide, behind Tzekou Mission. Tibet, 1904." G. Forrest. No. 142.

Platanthera stenostachya, Lindl. in Hook. Kew Journ. Bot. vi, p. 37; Rolfe in I.F.S. iii, p. 56.

" Moist hill pasture, Nantien valley, Bhamo–Teng-Yueh route. Elevation 4000–5000 ft. Flowers green. Yunnan, July 1904." G. Forrest. No. 165.

Platanthera iantha, Wight, Ic. v, p. 11, t. 1692; Rolfe in I.F.S. iii, p. 55.

" Dry hillsides, Teng-Yueh to Talifu route, Yung Ping valley. Elevation 6000 ft. Yunnan, August 1904." G. Forrest. No. 259.

Platanthera Susannae, Lindl. Gen. et Sp. Orch. p. 295; Rolfe in I.F.S. iii, p. 57.

" Marshy hillsides, common in places all over Yunnan. Elevation from 5000–9000 ft. Flowers greenish-white. September 1904." G. Forrest. No. 264.

Habenaria Bulleyi, Rolfe. Sp. nov.

Herba erecta, gracilis, 30–35 cm. alta. Tuber oblongum, 1–1.5 cm. longum. Caulis circiter 8 cm. longus, triphyllus, basi vaginis tubulosis obtectus. Folia caulina, patentia, linearia, subobtusa, 5–7 cm. longa. Scapi circiter 25 cm. longi, graciles, vaginis lanceolatis paucis obtecti; racemi 10 cm. longi, laxi, multiflori. Bracteae ovato-lanceolatae, acuminatae, 3–4 mm. longae. Pedicelli 5–6 mm. longi. Flores parvi. Sepalum posticum ovato-oblongum obtusum, subcarnosum, 2.5–3 mm. longum. Petala oblonga, subobtusa, 2.3–2.5 mm. longa. Labellum lineare, 3 mm. longum, basi angustum, ad medium tricuspidatum; lobi lineari-oblongi, carnosi; calcar oblongum, obtusum, paullo incurvum, 2.5 mm. longum; processibus stigmatiferis minutis.

" Plant of 1–2 ft. Flowers green. Barren mountain pastureland on the eastern slopes of the Tsan-Shan Range, west of Talifu. Lat. 25° 40′ N. Alt. 7000–8000 ft. W. Yunnan, September 1905." G. Forrest. No. 895.

Closely resembling *H. Forrestii*, Schlechter, in habit, but the lip shortly three-lobed and the spur only half as long.

Habenaria Duclouxii, Rolfe. Sp. nov.

Herba erecta, gracillima, 12–20 cm. alta. Tuber ovoideo-oblongum, 5–8 mm. longum. Caulis brevis, 2–3-phyllus, basi vaginis tubulosis paucis obtectus. Folia caulina, suberecta vel patentia, anguste linearia, acuta, 3–7 cm. longa, 1.5–2 mm. lata.

Scapi 8–15 cm. longi; racemi 5–8 cm. longi, angusti, laxiflori. Bracteae ovatae, acuminatae, 3–4 mm. longae. Pedicelli 5–6 mm. longi. Flores minuti, virides. Sepala subconniventia, ovato-oblonga, obtusa, 3 mm. longa. Petala anguste ovato-oblonga, obtusa, 3 mm. longa. Labellum profunde trifidum, 3 mm. longum; lobi laterales subfiliformes, suberecti, lobus intermedius oblongus, obtusus, carnosus; calcar subglobosum, 1 mm. longum. Columna lata, vix 1 mm. longa; processibus stigmatiferis minutis.

"Plant of 4–10 inches. Flowers green. Barren, damp moorland on the western slopes of the Tsan-Shan Range, near head of Yang-pi pass. Lat. 25° 40′ N. Alt. 9000–10,000 ft. W. Yunnan, September 1905." G. Forrest. No. 906.

Ducloux, No. 226.

Closely resembling *H. Bulleyi*, Rolfe, in habit, but dwarfer, and very different in its deeply three-lobed lip and short subglobose spur.

Habenaria ensifolia, Lindl. Gen. and Sp. Orch. p. 321; Rolfe in I.F.S. iii, p. 58.

"Valleys of Mekong and Salwin, Teng-Yueh–Talifu route. Elevation 6000–10,000 ft. Moist pastureland. Flowers green. Yunnan, August 1904. G. Forrest. No. 263.

Habenaria acuifera, Lindl. Gen. and Sp. Orch. p. 325; Hook. f. Fl. Brit. Ind. vi, p. 57; Rolfe in I.F.S. iii, p. 57.

"Moist hill pastureland, Nantien valley, Bhamo–Teng-Yueh route. Elevation 4000–5000 ft. Flowers bright yellow. Yunnan, July 1904." G. Forrest. No. 185.

Habenaria Miersiana, Champ. in Hook. Kew Journ. Bot. vii, p. 37; Hook f. Fl. Brit. Ind. vi, p. 60; Rolfe in I.F.S. iii, p. 60.

"Sides of gorge between Chien Chuan-cho and Niu Kai, Yunnan. Elevation 8000–9000 ft. September 1904." G. Forrest. No. 256.

"Dry, grassy hillsides, Chien Chuan valley. Alt. 7000–8000 ft. Flowers white. Yunnan, 1904." G. Forrest. No. 257.

Hemipilia flabellata, Bur. et Franch. in Journ. de Bot. v, p. 152; Rolfe in I.F.S. iii, p. 62.

"Dividing ridge between Hoching and Lichiang valleys. Elevation 9000 ft. Near Ling-Shan Ho river. Flowers purplish-rose. Yunnan, 1904." G. Forrest. No. 102.

Hemipilia Bulleyi, Rolfe. Sp. nov. Plate xii.

Tuber oblongum, 2–3 cm. longum. Caulis brevis, monophyllus, vaginis laxis membranaceis obtectus. Folia sessilia, amplexicaulia, late cordata, apiculata, 2.5–4 cm. longa, 2.5–4.5 cm. lata, subcoriacea. Scapi erecti, 15–25 cm. longi, vaginis paucis oblongo-lanceolatis obtecti; racemi 4–9 cm. longi, laxiflori. Bracteae ovato-lanceolatae, acuminatae, 8–10 mm. longae. Pedicelli incurvi, 1.5–1.8 cm. longi. Flores purpurei. Sepalum posticum erectum, ovato-oblongum, obtusum, concavum, 5–6 mm. longum; sepala lateralia recurva, obliqua, semiovata, obtusa, 7–8 mm. longa. Petala suberecta, semiovata, subacuta, 4 mm. longa. Labellum subsessile, trilobum, 7 mm. longum, lateribus reflexis; lobi laterales oblongi vel triangulari-oblongi, apice breviter dentati, 2–3 mm. longi; lobus intermedius flabellato-obovatus, obtusus, crenulatus; discus minutissime puberulus; calcar 1.5–1.8 cm. longum, subrectum, crassiusculum, obtusum, basi anguste infundibuliforme. Columna lata, 3 mm. longa; rostellum cordato-oblongum, cucullatum, ascendens, circiter 1.3 cm. longum.

"Mekong-Salwin divide, behind Tzekou Mission. Elevation, Tibet. 1904." G. Forrest. No. 136.

"Dry, shady banks, head of Hoching valley. Flowers reddish-purple. Alt. 8000 ft. Yunnan, 1904." G. Forrest. No. 204.

Readily distinguished from *H. flabellata*, Bur. et Franch., by the shape of the lip, which is subsessile, strongly reflexed at the sides, and has well-developed side lobes.

Hemipilia Forrestii, Rolfe. Sp. nov.

Tuber oblongum, 3–4.5 cm. longum. Caulis brevis, monophyllus. Folia sessilia, amplexicaulia, ovato-oblonga, acuta, concava, circiter 4.5 cm. longa, 2.5 cm. lata, subcoriacea. Scapus erectus, 20 cm. longus, vaginis ovato-lanceolatis acuminatis obtectus; racemus 6 cm. longus, laxiflorus. Bracteae lanceolatae vel ovato-lanceolatae, acuminatae, 1–1.2 cm. longae. Pedicelli circiter 2 cm. longi. Flores speciosi roseo-purpurei. Sepalum posticum erectum, ovato-oblongum, obtusum, concavum, circiter 6 mm. longum; sepala lateralia recurva, obliqua, semiovata, subobtusa, concava, 1.2 cm. longa. Petala ovato-oblonga, obtusa, 5 mm. longa. Labellum sessile, quadrato-obovatum, truncatum, crenatum, 1.3 cm. longum, 1 cm. latum; discus basi obtuse carinatus; calcar circiter 3 cm. longum, paullo incurvum, a basi attenuatum et subacutum. Columna lata, 5 mm. longa; rostellum ovato-oblongum, subobtusum, cucullatum, ascendens, circiter 3 cm. longum.

"Plant of 6–9 inches. Flowers rose-red. Ledges of cliffs forming banks of the Salwin, Salwin-Irrawadi divide, between Ya-Ko and La-To-Wa-Di. Lat. 26° 30′. Alt. 2900 ft. N.W. Yunnan, November 1905." G. Forrest. No. 865.

Markedly different from *H. Henryi*, Reichb. f., in the broad entire lip and the longer attenuate spur. The leaf on the single specimen seen is also much smaller and narrower.

Satyrium nepalense, Don, Prodr. Fl. Nepal. p. 26; Hook f. Fl. Brit. Ind. vi, p. 168; Rolfe in I.F.S. iii, p. 63.

"Dry pastureland at an elevation of 12,000–13,000 ft. Chung Tien plateau, flowers flesh coloured, odour same as hyacinth. Yunnan, September 1904." G. Forrest. No. 144.

"Erect plant of 1–2 ft. Flowers rose-pink, deliciously fragrant, almost identical with wild hyacinth. Dry, open, grassy hillsides (limestone), Salwin valley, Salwin-Irrawadi divide. Lat. 26°–27° N. Alt. 7000–10,000 ft. Common over all N.W. Yunnan, November 1905." G. Forrest. No. 965.

"Plant of 1–1½ ft. Flowers rose-pink, fragrant. Dry, open downs around Teng-Yueh. Lat. 25° N. Alt. 6000–8000 ft. W. Yunnan, September 1905." G. Forrest. No. 996.

A particularly large form, of which the flowers are not well preserved.

Satyrium yunnanense, Rolfe. Sp. nov.

Tuber ovoideo-oblongum, 1.5–2 cm. longum. Caulis brevis, vaginis spathaceis paucis obtectus, diphyllus. Folia sessilia, patentia, ovata vel ovato-oblonga, obtusa, 5–10 cm. longa, 3–5 cm. lata. Scapi erecti, 20–25 cm. alti, vaginis paucis spathaceis obtecti; racemi ovoideo-oblongi, densiflori, 4–6 cm. longi. Bracteae reflexae, ovatae, subobtusae, 1.5–2 cm. longae. Pedicelli 7–9 cm. longi. Flores aurantiaci. Sepalum posticum oblongum, obtusum, 5–6 mm. longum; sepala lateralia subpatentia, ovato-oblonga, obtusa, 6–7 mm. longa. Petala elliptico-oblonga, obtusa, 4–5 mm. longa. Labellum late galeatum, 4–5 mm. longum, lateribus late rotundatis; calcaria lineari-oblonga, subobtusa, 6 mm. longa. Columna 4 mm. longa; stigma late spathulata; rostellum breve, latum, subtruncatum.

"Western slope of the Niu Chang pass, between Ke-Lo-Wan and the Chung Tien plateau. Moist, rocky places. Elevation 7000–10,000 ft. Flowers bright orange. Yunnan. September 1904." G. Forrest. No. 143.

Ducloux, 190.

Allied to *S. nepalense*, Don, but readily separated by the short inflorescence, orange-coloured flowers, and shorter, straight spurs of the lip.

Cypripedium tibeticum, King, ex Rolfe in Journ. Linn. Soc. xxix, p. 320; Rolfe in I.F.S. iii, p. 66.

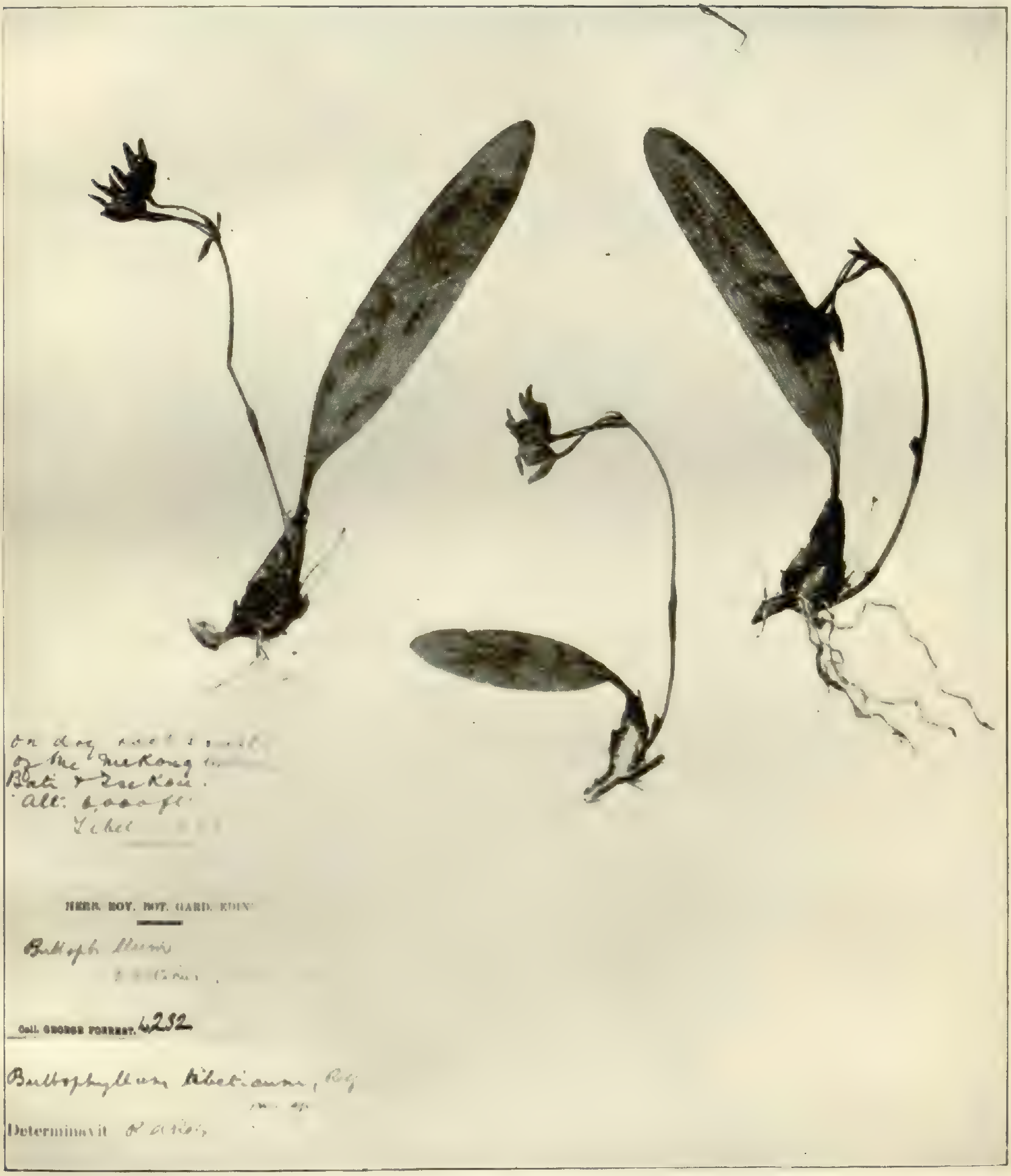
"Mekong-Salwin divide, behind Tzekou Mission. Tibet, 1904." G. Forrest. No. 157.

LIST OF PLATES

Illustrating Mr. R. A. Rolfe's Paper on Orchideae collected by George Forrest in Yunnan and Eastern Tibet.

The plates are taken from photographs by Mr. R. Adam of dried specimens in the Herbarium of the Royal Botanic Garden, Edinburgh.

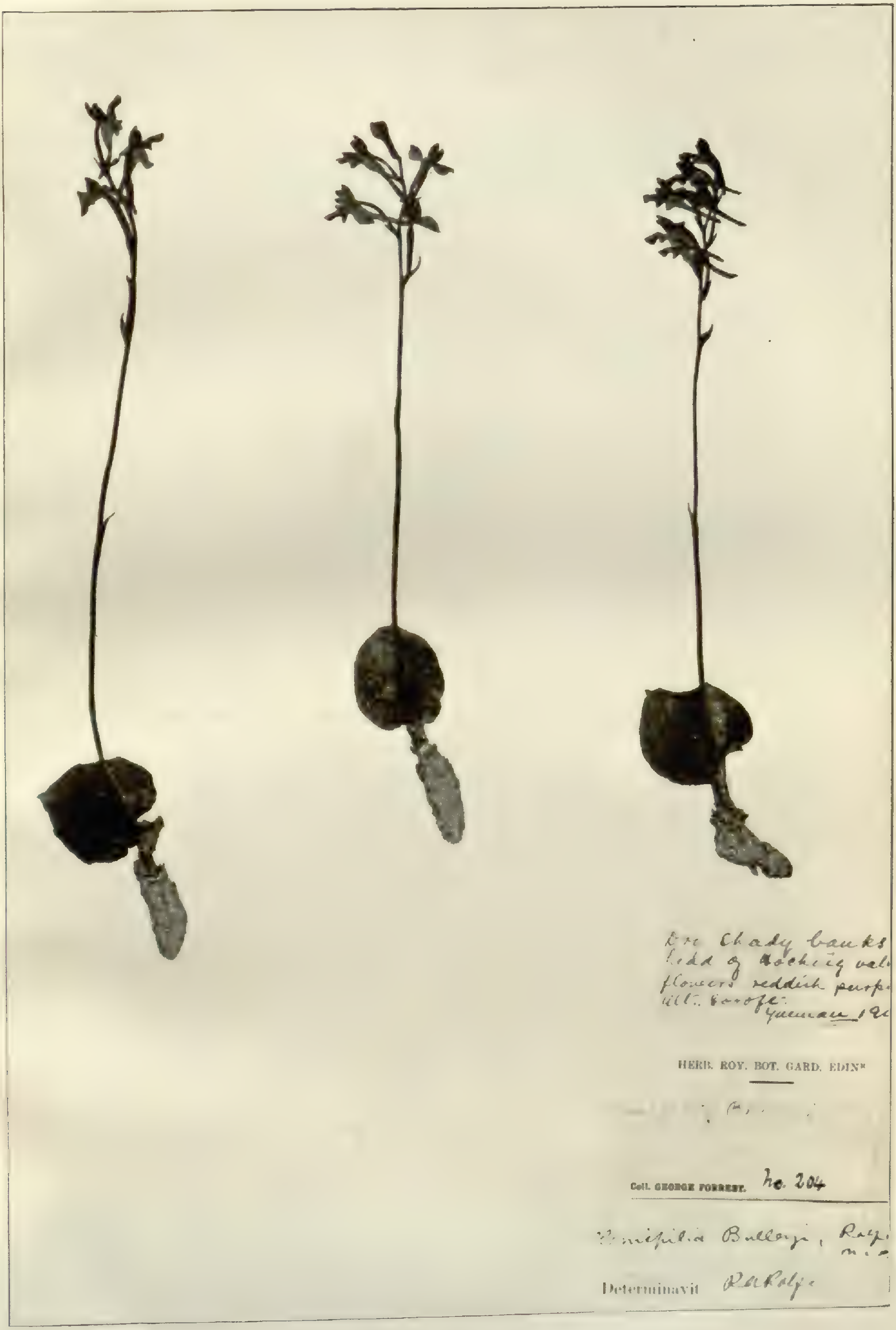
PLATE IX. Bulbophyllum tibeticum, Rolfe. Sp. nov.
X. Cirrhopetalum amplifolium, Rolfe. Sp. nov.
XI. Cymbidium Forrestii, Rolfe. Sp. nov.
XII. Hemipilia Bulleyi, Rolfe. Sp. nov.


On dry rocks
of the Mekong
Bati & Tsekou.
Alt: 6,000 ft.
Tibet
HERB. ROY. BOT. GARD. EDIN.
Coll. GEORGE FORREST. 6232
Bulbophyllum tibeticum, Rolfe
Determinavit

BULBOPHYLLUM TIBETICUM, ROLFE.

CIRRHOPETALUM AMPLIFOLIUM, ROLFE.

CYMBIDIUM FORRESTII, ROLFE.


On shady banks
side of Hoching val
flowers reddish purp
Alt. 8000 ft.
Yunnan 19
HERB. ROY. BOT. GARD. EDINR
Coll. GEORGE FORREST. No. 204
Hemipilia Bulleyi, Rolf
n. s
Determinavit R A Rolfe

HEMIPILIA BULLEYI, ROLFE.

Plantae Chinenses Forrestianae.

Plants discovered and collected by George Forrest during his first exploration of Yunnan and Eastern Tibet in the years 1904, 1905, and 1906.

Description of New Species of Geranium.

BY

DR. R. KNUTH,
Berlin.

Geranium kariense, R. Knuth. Sp. nov. in Geraniaceae in Engl. Pflanzenreich iv, 129 (1912), p. 577.

Caulis 30–50 cm. altus, suberectus vel erectus, demum glaber vel superne pilis recurvatis sparsim obsitus, angulosus, supra basin pseudo-dichotome ramosus. Folia inferiora longe petiolata; petioli graciles, non raro tortuosi, 1–1½ mm. crassi, pilis retro-adpressis praecipue laminam versus densius obsiti; folia superiora brevissime petiolata, sed non sessilia; lamina supra sparsim adpresse pilosa, subtus ad venas tantum pilis setosiusculis adpressis obsita, usque 10 cm. lata et 6–7 cm. longa (a basi ad apicem), ambitu 5-angulata, usque ad ⅞ palmato-5-partita, lobis e basi integra cuneata elongato-rhomboideis, apice satis longe producto acutis vel acuminatis, marginibus anterioribus grosse dentato-incisis vel incisis, laciniis et acinulis oblongis acutis et minutissime mucronulatis. Stipulae membranaceae, fuscae, ± lanceolatae, ± acuminatae, acutae vel acutissimae, integrae, mediae usque 10 mm. longae et 4 mm. latae. Inflorescentia corymbosa; folia floralia saepe ad unum lobum grosse incisum reducta, brevissime petiolata. Pedunculi bini, 2-flori, quam folium 1½–3-plo longiores, usque 6 cm. longi, indumento satis brevi ± retro-adpresso eglanduloso obsiti. Bracteae subulatae vel capillares, basi vix latiores, 5–6 mm. longae. Pedicelli demum divaricati vel recurvati, calyce 1½–2½-plo longiores, pilis albidis setosiusculis retro-adpressis eglandulosis dense obsiti, 1–2 cm. longi. Sepala glabra, ad nervos (3) sparsissime pilis sursum directis adpressis ornata, ovata vel lanceolato-ovata, margine anguste membranacea, demum apicem versus acuminata, mucronata mucrone 1–2 mm. longo, cum mucrone 8–10 mm. longa. Petala fusco-purpurea, calycem superantia, sub anthesi perfecte recurvata, ± late obovata, integra, basi longe patule albo-villosa; circ. 10 mm. longa. Filamenta glabra vel ad basin sparsim ciliata, calyce longiora; antherae oblongae, atropurpurea. Pistillum glabrum vel sparsissime barbatum. Fructus immaturus 28 mm. longus; valvulae pubescentes; rostrum sparsim puberulum, supra medium filiforme.

"Flowers magenta. Moist pine woods, western slope of Kari pass, Mekong-Yangtze divide. Elevation 11,000–13,000 ft. Yunnan. September 1904." G. Forrest. No. 97.

Geranium Forrestii, R. Knuth. Sp. nov. in Geraniaceae in Engl. Pflanzenreich iv, 129 (1912), p. 578.

Rhizoma lignosum, perpendiculare, versus collum 8–10 mm. crassum. Caulis 20–45 cm. altus, suberectus vel erectus, demum glaberrimus vel superne sparsim pilosus, iuvenilis non raro retro-setoso-pubescens, angulosus, superne (2–15 cm. supra basin) pseudo-dichotome ramosus, inferne simplex. Folia inferiora satis longe petiolata; petioli usque 10 cm. longi, satis graciles, vix 2 mm. crassi, pilis recurvatis vel retrorsis praecipue laminam versus puberuli; folia superiora brevissime petiolata, summa sessilia; lamina supra glabra vel sparsim hyaline pilosa, subtus praecipue ad nervos pilis setosis hirsuta, usque 7 cm. lata, 4½ cm. longa (a basi ad apicem), ambitu reniformi-rotundata, usque ad $\frac{6}{7}$ palmato-5(-7)-partita, lobis e basi integra cuneata rhomboideis, apice producto acutis vel fere acuminatis, incisis, laciniis et lacinulis oblongis acutis. Stipulae firmae, fuscae, deltoideo-lanceolatae, acutae vel acutissimae, integrae, inferiores usque 2 cm. longae, basi 4–5 mm. latae. Inflorescentia racemoso-corymbosa; folia floralia lobis multo angustioribus dentatis instructa, sessilia. Pedunculi, saepe trini, 2–3-flori, folio 2–3-plo longiores, usque 6 cm. longi, indumento patulo albo eglanduloso ± divaricatulo obsiti. Bracteae subulatae vel capillares, basi vix latiores, 5–6 mm. longae. Pedicelli demum divaricati vel recurvati, calyce 1–2-plo longiores, indumento satis brevi patulo-retrorso setoso dense obtecti, 1–2 cm. longi. Sepala pilis sursum adpressis vix dense subsericea, ovato-lanceolata, trinervata, margine vix membranacea, apicem versus acuminata, mucronata mucrone 1½ mm. longo, cum mucrone 8–9 mm. longa. Petala atro-purpurea, calycem superantia, sub anthesi perfecte patula, obovata, integra, basi longe patule albo-villosa, circ. 9 mm. longa. Filamenta infra medium margine sparsim ciliata; antherae lineari-oblongae nigricantes. Pistillum sericeum. Fructus maturus (?) 3 cm. longus; valvulae pubescentes; rostrum puberulum, superne filiforme (per partem quartam superiorem).

"Plant of 1–2 ft. Flowers deep rose-purple. Shady openings in pine forests on the eastern flank of the Tali Range. Lat. 25° 40′ N. Alt. 9000–10,000 ft. August 1906. W. Yunnan." G. Forrest. No. 4282.

Nota.—*G. Forrestii* et *G. kariense* a ceteris speciebus sectionis *Reflexa* earundem regionum, *G. Delavayi* et *G. platypetalo*, manifeste secedunt pedicellis eglandulosis. Inter se facile distinguuntur foliorum forma et inflorescentia.

Geranium candicans, R. Knuth. Sp. nov. in Geraniaceae in Engl. Pflanzenreich iv, 129 (1912), p. 580.

Rhizoma obliquum vel verticale, sublignosum, circ. 1 cm. crassum, apice non dilatatum, stipulis pallide fuscis vel lutescentibus foliorum basalium vix dense ornatum, unicaule. Caulis erectus vel suberectus, 30–35 cm. altus, manifeste angulosus, pro maxima parte glaberrimus, superne pilis recurvatis vel retroadpressis vix dense obsitus, inferne (saltem 10 cm.) simplex, sursum pseudo-dichotome ramosus, ramis cauli subaequilongis. Folia basalia et caulina inferiora longe petiolata petiolis quam lamina 2½–4–plo longioribus, angulosis, inferne glabris, versus laminam pilis retrorsis puberulis, 10–15 cm. longis; lamina reniformi-orbicularis, usque 8 cm. lata, a basi ad apicem usque 4½ cm. longa, supra glabra vel pilis raris obsita, infra ad nervos tantum setoso-pilosa, usque ad ¾ vel rarius ultra palmato–5–partita, lobis ambitu cuneato-obovatis, marginibus anterioribus 3–5–lobulato-dentatis, lobulis lateralibus integris acutiusculis vel obtusiusculis, lobulo medio saepe maiore apice iterum tridentato; folia caulina superiora brevissime petiolata, sed non sessilia, a basalibus diversa lobis angustioribus, utroque margine 2–4–dentatis, acuminatis, acutis. Stipulae pallide vel rubro-fuscae, ± lanceolatae, ± abrupte angustatae, acutissimae vel obtusae, puberulae. Pedunculi biflori, sicut pedicelli pilis retrorsis dense obsiti, folio petiolato 1–2–plo longiores, 4–8 cm. longi. Stipulae lineari-lanceolatae vel lanceolatae, 8 mm. longae, mox rubrofuscae et glabrae, abrupte angustatae, acutae. Pedicelli 10–35 mm. longi, sub calyce dense retrorso-pilosi, fructiferi verisimiliter recurvati. Sepala 3–nervata, ovato-oblonga, mucronata mucrone 1–1½ mm. longo, cum mucrone demum 10 mm. longa, late membranaceo-marginata. Petala calyce mucronato 1½–1¾–plo longiora, 17 mm. longa et 12 mm. lata, late obovata, integra vel vix perspicue undulata, intense alba, nervis vix perspicuis. Stamina calyce paullo breviora; filamenta sicut petalorum basis pilis longis albis patulis inferne dense hispida; antherae lineari-oblongae, atro-purpureae. Pistillum albo-lanuginoso-villosum. Fructus. . . .

"Plant of 9–14 inches. Flowers pure white, anthers dark crimson. Open, grassy situations in pine forests on the eastern flank of the Tali Range. Lat. 25° 40′ N. Alt. 10,000–11,000 ft. June 1906. W. Yunnan." G. Forrest. No. 1879.

Nota.—Species affinis est *G. Wlassowiano*, a quo distinguitur primo aspectu floribus magnis, 4 cm. diam., intense albis.

Geranium strictipes, R. Knuth. Sp. nov. in Geraniaceae in Engl. Pflanzenreich iv, 129 (1912), p. 580.

Rhizoma lignosum, perpendiculare, infra collum 8–10 mm. crassum, ad collum saepe valde incrassatum, usque 3 cm. crassum, 1–4–caule. Caulis 20–50 cm. altus, suberectus vel erectus, inferne sparsissime, superne dense indumento simplici patulo manifeste inaequilongo hyalino subhirsutus, praecipue inferne angulosus, 2–10 cm. supra basin regulariter pseudo-dichotome ramosus, inferne simplex. Folia basalia et caulina inferiora vix longe petiolata; petioli usque 10 cm. longi, graciles, 1–1¼ mm. crassi, pilis longis setosiusculis tenuibus in petiolis superioribus tantum dense obtecti; folia superiora gradatim brevius petiolata, summa autem non sessilia; lamina supra et subtus ad venas setis hyalinis ± dense obsita, usque 4–5 cm. lata, 2½ cm. longa (a basi ad apicem), ambitu rotundato- vel saepius reniformi-5-angulata, usque ad ⅚ palmato-5-partita, lobis e basi angustata flabellatis; lobi vix usque ad medium trilobulati, lobulis oblongis vel cuneatis vel fere rectangulis, apice 2–3-dentatis, dentibus acutiusculis. Stipulae lineares, tenues, circ. 1–2 mm. latae, sicut caulis saepe mox rubellae, acutae vel acutissimae; stipulae basales mox deciduae. Pedunculi quam folium 1–3-plo longiores, usque 10 cm. longi, plerumque autem breviores, graciles, vix 1 mm. crassi, sicut pedicelli indumento simplici patulo manifeste inaequilongo hyalino hirsutiusculi. Bracteae subulatae, 6–10 mm. longae, hirsutae. Pedicelli pedunculis non tenuiores, calyce 1⅓–2-plo longiores, 1–2 cm. longi, fructiferi stricte erecti. Sepala pilis setosis hyalinis subhirsuta, ovata vel ovato-lanceolata, 3-nervata, margine vix membranacea, apicem versus vix acuminata, mucronata mucrone demum saepe purpurascente 2–2½ mm. longo, cum mucrone 10 mm. longa, 3 mm. lata. Flos 22 mm. diam.; petala roseo-purpurea, calycem mucronatum 1½–1¾-plo superantia, late cuneata, apice retuso leviter emarginata vel integra, margine inferne longe ciliata, circ. 12 cm. longa, 7 mm. lata. Filamenta et pistillum quam calyx (sine mucrone) breviora: filamenta lineari-subulata. Pistillum niveo-sericeum. Fructus rostratus 30 mm. longus; valvulae sparsim puberulae; rostrum indumento brevi setosiusculo satis dense obtectum.

" Plant of 1–2 ft. Flowers rose-pink. Dry, stony situations amongst scrub and in thickets on the eastern flank of the Lichiang Range. Lat. 27° 20′ N. Alt. 10,000–11,000 ft. June 1906. N.W. Yunnan." G. Forrest. No. 2369.

Nota.—Species certe ad formas *G. strigosi*, Franch., pertinet. Fortasse est synonymum var. *gracilis*. Mea sententia autem varietates melius pro speciebus habendae sunt.

Plantae Chinenses Forrestianae.

Plants discovered and collected by George Forrest during his second exploration of Yunnan and Eastern Tibet in the year 1910.

Enumeration and Description of Species of Pedicularis.

BY

GUSTAVE BONATI,
Lure.

SECT. I. SIPHONANTHA.

1. **P. siphonantha,** Don.

"Plant of 6–10 inches. Flowers bright rose. Shady situations in fixed forests on the eastern flank of the Lichiang Range. Lat. 27° 30′ N. Alt. 10,000 ft. August 1910." G. Forrest. No. 6278.

"Plant of 2–4 inches. Flowers bright rose. On limestone drift on the eastern flank of Lichiang Range. Lat. 27° 30′. Alt. 13,000 ft. August 1910." G. Forrest. No. 6385.

"Plant of 2–3 inches. Flowers deep rose. Stony alpine pasture on the eastern flank of the Lichiang Range. Lat. 27° 30′ N. Alt. 12,000–13,000 ft. August 1910." G. Forrest. No. 6479.

2. **Pedicularis Delavayi,** Franch.

"Plant of 2½–5 inches. Flowers bright rose. Open alpine pasture on the eastern flank of the Lichiang Range. Lat. 27° 35′ N. Alt. 12,000–14,000 ft. June 1910." G. Forrest. No. 6038.

"Plant of 2–5 inches. Flowers bright rose. Moist, stony alpine pasture on the eastern flank of the Lichiang Range. Lat. 27° 30′ N. Alt. 13,000–14,000 ft. September 1910." G. Forrest. No. 6596.

3. **Pedicularis sigmoidea,** Franch.

No. 7023. Without locality.

4. **Pedicularis Elwesii,** Hook. f.

"Plant of 6–10 inches. Flowers bright rose. Dry, stony pasture on the western flank of the Lichiang Range. Lat. 27°

[Notes, R.B.G., Edin., No. XXXVI, March 1913.]

25′ N. Alt. 12,000–13,000 ft. June 1910." G. Forrest. No. 5760.

5. **Pedicularis oxycarpa,** Franch.

"Plant of 8–16 inches. Flowers white, upper segment red. Mountain meadows on the eastern flank of the Lichiang Range. Lat. 27° 30′ N. Alt. 11,000–12,000 ft. July 1910." G. Forrest. No. 6076.

6. **Pedicularis cephalantha,** Franch.

"Plant of 6–10 inches. Flowers bright rose. Open mountain meadows on the eastern flank of the Lichiang Range. Lat. 27° 20′ N. Alt. 11,000–12,000 ft. June 1910." G. Forrest. No. 5810.

"Plant of 6–12 inches. Flowers bright rose. Mountain pasture on the eastern flank of the Lichiang Range. Lat. 27° 20′ N. Alt. 11,000–13,000 ft. June 1910." G. Forrest. No. 5925.

7. **Pedicularis longepetiolata,** Franch.

"Plant of 10–15 inches. Flowers rose. Pasture on the margins of pine forests on the eastern flank of the Lichiang Range. Lat. 27° 30′ N. Alt. 11,000 ft. July 1910." G. Forrest. No. 6257.

8. **Pedicularis polyphylloides,** Bonati. Sp. nov.

Radix repens. Species diffusa, multicaulis, scapis ac ramis patulis, repentibus, pilis longis albis vel fuscis tectis. Scapi 10–30 cm. longi, simplices vel basi ramosi. Folia alterna, subsessilia, ovato-oblonga, 25–60 mm. longa, 5–25 mm. lata, bipinnatifida, loborum oblongorum 7–9 jugis, lobulis acutidentatis. Flores omnes axillares valde distantes, longe pedunculati; pedunculis villosis, patulis, 20–35 mm. longis. Calyx membranaceus, basi cylindricus, 10–12 mm. longus, dense pilis longis fuscis tectus, anticem usque ad medium fissus; lobis 5 sessilibus, foliaceis, subaequalibus, profunde lobulatis, lobulis obtusis. Corolla rosea; tubo 12–15 mm. longo, calycem paulo superante, intus glabro, summo dilatato; galea rectangulatim curvata, dorso piloso ac rotundo, abrupte contracto in apicem filiformem, paulo arcuatum, 5–7 mm. longum summo bifidum; labio inferiore superius aequante, margine ciliato, lobis lateralibus rotundis, lobo medio parvo ac vix proeminente. Stamina medio tubi inserta, filamentis omnibus villosis. Capsula glabra, calycem vix superans, apice lateraliter ejecto. Semina?

"Semi-prostrate plant of 6–20 inches. Flowers rose. Dry, open situations in pine forests on the eastern flank of the Lichiang

Range. Lat. 27° 30′ N. Alt. 10,000 ft. August 1910." G. Forrest. No. 6321.

"Eastern flank of the Lichiang Range. Lat. 27° 30′ N. Alt. 12,000–13,000 ft. August 1910." G. Forrest. No. 6405*a*.

Plante intermédiaire entre les *P. polyphylla*, Franch. et *P. Stadlmanniana*, Bonati. Elle diffère du premier—

1. par son port ;
2. parcequ'elle est plus développés dans toutes ses parties ;
3. par son inflorescence beaucoup plus lâche et ses fleurs longuement pédonculées, à pédoncules étalés ou réfléchis ;
4. par le tube de la corolle glabre intérieurement à la base ;
5. par la lèvre inférieure plus densement ciliée.

Elle diffère du *P. Stadlmanniana*, Bonati—

1. parcequ'elle est plus grande dans toutes les parties ;
2. par ses feuilles subsessiles à lobes plus nombreux.
3. par ses pédoncules plus allongés.
4. par les lobes du calice sessiles.

SECT. II. ORTHORRHYNCHA.

9. **Pedicularis axillaris,** Franch.

"Semi-prostrate plant of 6–18 inches. Flowers rose. Damp situations in mixed and pine forests on the eastern flank of the Lichiang Range. Lat. 27° 20′ N. Alt. 10,000–11,000 ft. June 1910." G. Forrest. No. 5771.

Nos. 7013, 7166. Without locality.

10. **Pedicularis alopecuros,** Franch.

"Plant of 1–2 ft. Flowers, lower lobe bright yellow, upper lobe rose. Pasture on the margins of pine forests on the eastern flank of the Lichiang Range. Lat. 27° 30′ N. Alt. 11,000 ft. August 1910." G. Forrest. No. 6356.

11. **Pedicularis Smithiana,** Bonati.

"Plant of 1½–2 ft. Flowers yellow. On the margins of thickets and fixed forests on the eastern flank of the Lichiang Range. Lat. 27° 25′ N. Alt. 10,000–11,000 ft. July 1910." G. Forrest. No. 6247.

12. **Pedicularis gracilis,** Wall.

"Plant of 1½–2 ft. Flowers rose. Shady situations in pine forests on the eastern flank of the Lichiang Range. Lat. 27° 25′ N.

Alt. 10,000–11,000 ft. August 1910." G. Forrest. No. 6450.

No. 6836. Without locality.

13. **Pedicularis brevifolia,** Don.

No. 7054. Without locality.

14. **Pedicularis Wettsteiniana** ×, Bonati (*Pedicularis brevifolia,* Don, × *P. porrecta,* Wall. ?).

Caules 20–45 cm. alti, simplices vel ramosi, infra glabri, summo villosi. Folia inferiora generaliter opposita, aliquando alterna, petiolata; petiolis 10–15 mm., alatis; limbo ovato-acuto, 15–20 mm. longo, 8–12 mm. lato, pinnatifido, 4–5 jugis segmentorum linearium plus minusve incisorum. Folia media ac superiora subsessilia, generaliter verticillata, ternata. Bracteae foliaceae, sessiles, basi membranaceae ac attenuatae. Flores 4-verticillati, breve pedunculati. Calyx membranaceus, basi dilatatus, 5–7 mm. longus; lobo summo integro, lateralibus foliaceis. Corolla magna (20 mm.), tubo calyce duplo longiore, galea rectangulata paulatim attenuata in apicem filiformem, 5–6 mm. longum, summo integrum et obtusum, paulo arcuatum; labio inferiore superius aequante, margine ciliato. Stamina medio tubi inserta; filamenta omnia glabra. Capsula ac semina ?

"Eastern flank of the Tali Range. Lat. 25° 40′ N." G. Forrest. No. 6984.

Plante intermédiaire et probablement hybride entre les *P. porrecta,* Wall., et *P. brevifolia,* Don. Elle diffère du premier par ses tiges velues supérieurement, par ses feuilles souvent verticillées, par sa lèvre ciliée; elle s'éloigne du second par ses tiges glabres à la base, par ses étamines insérées au milieu du tube, par son bec non bifide. Elle est voisine aussi du *P. leiandra,* Franch., dont elle diffère à première vue par sa grande taille, ses tiges moins pileuses, ses feuilles, etc.

SECT. III. RHYNCHOLOPHA ALTERNIFOLIA.

15. **Pedicularis tenuisecta,** Franch.

"Plant of 1–2 ft. Flowers deep rose. Dry situations in pine forests on the eastern flank of the Lichiang Range. Lat. 27° 25′ N. Alt. 10,000–11,000 ft. August 1910." G. Forrest. No. 6294.

f. **albiflora.**

"Plant of 15 inches. Flowers white. Open pasture on the margins of pine forests on the eastern flank of the Lichiang Range. Lat. 27° 25′ N. Alt. 11,000 ft. August 1910." G. Forrest. No. 6330.

16. **Pedicularis crenata,** Maxim.

"Plant of 3–6 inches. Flowers deep rose. Alpine pasture on the eastern flank of the Lichiang Range. Lat. 27° 30′ N. Alt. 12,000–13,000 ft. August 1910." G. Forrest. No. 6405.

No. 7217. Without locality.

17. **Pedicularis filicula,** Franch.

"Plant of 6–9 inches. Flowers rose. Open pasture on the eastern flank of the Lichiang Range. Lat. 27° 20′ N. Alt. 12,000 ft. June 1910." G. Forrest. No. 5761.

18. **Pedicularis recurva,** Maxim., var. **polyantha,** Bonati.

"Plant of 9–18 inches. Flowers dull purplish-crimson. Open alpine pasture on the eastern flank of the Lichiang Range. Lat. 27° 30′ N. Alt. 12,000 ft. July 1910." G. Forrest. No. 6246.

19. **Pedicularis lachnoglossa,** Hook. f.

"Plant of 6–9 inches. Flowers deep rose. Open, stony pasture on the western flank of the Lichiang Range. Lat. 27° 25′ N. Alt. 12,000 ft. June 1910." G. Forrest. No. 6036.

2040 20. **Pedicularis lachnoglossa,** Hook. f. var. **macrantha,** Bonati. Var. nov.

A specie typica differt—

1. dentibus calycis integris;
2. floribus valde majoribus (2 cm.), galea tota villosa;
3. labio inferiore valde majore, superius vix superante, lobis summo rotundis nec attenuatis;
4. caulibus plus foliosis, floribus sessilibus.

"Plant of 12–20 inches. Flowers rose-crimson. Open mountain meadows on the eastern flank of the Lichiang Range. Lat. 27° 35′ N. Alt. 11,000 ft. June 1910." G. Forrest. No. 5821.

L'examen de nouveaux échantillons permettra dans la suite de voir si ces caractères sont constants. Dans le cas de l'affirmative, il faudra faire de cette plante une éspèce distincte.

21. **Pedicularis rhodotricha,** Maxim.

"Plant of 6–9 inches. Flowers dull crimson. On limestone cliffs on the eastern flank of the Lichiang Range. Lat. 27° 35′ N. Alt. 14,000 ft. September 1910." G. Forrest. No. 6659.

SECT. V. BIDENTATA VERA.

22. **Pedicularis hirtella,** Franch.

"Plant of 6–12 inches. Flowers white. Open situations amongst scrub on the eastern flank of the Lichiang Range. Lat. 27° 35′ N. Alt. 11,000 ft." September 1910. G. Forrest. No. 6702.

SECT. VI. BIDENTATA VERTICILLATA.

23. **Pedicularis comptoniaefolia,** Franch.

"Plant of 2–4 ft. Flowers rose. Dry, open situations in pine forests on the eastern flank of the Lichiang Range. Lat. 27° 30′ N. Alt. 10,000–11,000 ft. August 1910." G. Forrest. No. 6325.

No. 7045. Without locality.

24. **Pedicularis lutescens,** Franch.

"Plant of 4–8 inches. Flowers bright yellow. On chalky pasture on the eastern flank of the Lichiang Range. Lat. 27° 25′ N. Alt. 11,000 ft. August 1910." G. Forrest. No. 6362.

Nos. 6840, 6977. Without locality.

25. **Pedicularis rex,** Clarke.

"Plant of 1–2 ft. Flowers pale yellow, tipped rose. Moist situations in pine forests on the eastern flank of the Lichiang Range. Lat. 27° 30′ N. Alt. 11,000 ft. July 1910." G. Forrest. No. 6157.

26. **Pedicularis superba,** Franch.

"Plant of 1½–3 ft. Flowers deep rose. Open mountain meadows on the eastern flank of the Lichiang Range. Lat. 27° 30′ N. Alt. 11,000–12,000 ft. July 1910." G. Forrest. No. 6234.

"Plant of 6–18 inches. Flowers rose-red. Moist, gravelly situations on the margins of pine forests on the eastern flank of the Lichiang Range. Lat. 27° 35′ N. Alt. 10,000–11,000 ft. October 1910." G. Forrest. No. 7395.

SECT. VII. ANODONTA VERA.

27. **Pedicularis Oederi,** Vahl. var. **bracteosa,** Bonati. Var. nov.

Species caespitosa 5–10 cm. alta, pubescens. Speciei typicae affinis dentibus calycis deltoideis, basi latis; ab illa differt sepalis profunde lobatis. Ab aliis varietatibus descriptis differt bracteis triangularibus, latissimis (1 cm. ac ultra), membranaceis, basi cuneatis. Filamenta duo, sub antheris villosa.

"Plant of 1½–4 inches. Flowers bright yellow. Alpine meadows on the eastern flank of the Lichiang Range. Lat. 27° 40′ N. Alt. 14,000–15,000 ft. June 1910." G. Forrest. No. 6097.

SECT. VIII. ANODONTA VERTICILLATA.

28. **Pedicularis salviaeflora,** Franch.

"Weakly scandent plant of 4–6 ft. Flowers rose. Amongst scrub on the eastern flank of the Lichiang Range. Lat. 27° 25′ N. Alt. 10,000–11,000 ft. August 1910." G. Forrest. No. 6348.

29. **Pedicularis densispica,** Franch.

"Plant of 4–9 inches. Flowers pale rose. Dry pastureland on the north end of the Lichiang valley. Lat. 27° 20′ N. Alt. 9000 ft. July 1910." G. Forrest. No. 6209.

"Plant of 12–20 inches. Flowers pale rose. Stony pasture on the margins of forests on the eastern flank of the Lichiang Range. Lat. 27° 25′ N. Alt. 11,000 ft. July 1910." G. Forrest. No. 6256.

30. **Pedicularis likiangensis,** Franch.

"Plant of 2–6 inches. Flowers rose. Alpine meadows on the eastern flank of the Lichiang Range. Lat. 27° 40′ N. Alt. 14,000–15,000 ft. June 1910." G. Forrest. No. 6096.

31. **Pedicularis rupicola,** Franch.

"Plant of 3–6 inches. Flowers bright rose. On limestone drift on the eastern flank of the Lichiang Range. Lat. 27° 30′ N. Alt. 12,000 ft. June 1910." G. Forrest. No. 5994.

"Plant of 3–6 inches. Flowers bright rose. On limestone drift on the eastern flank of the Lichiang Range. Lat. 27° 30′ N. Alt. 11,000–12,000 ft. July 1910." G. Forrest. No. 6193.

"Plant of 4–6 inches. Flowers pale rose. On limestone drift on the western flank of the Lichiang Range. Lat. 27° 28′ N. Alt. 13,000 ft. August 1910." G. Forrest. No. 6429.

En résumé la collection récoltée par Mr. Forrest en 1910 contient 31 espèces de pediculaires. L'une de ces espèces, le *P. polyphylloides*, pourrait être considéré comme une variété du *P. Stadlmanniana*, avec lequel elle a les plus grandes affinités; par contre, le *P. lachnoglossa*, Hook. f., var. *macrantha*, me semble

devoir être considéré comme une espèce nouvelle en voie d'élaboration.

Si nous comparons la nouvelle collection à la précédente, nous voyons qu'elle est, numériquement, bien inférieure (31 espèces contre 43). De même les formes nouvelles sont rares et presentent, peut-être, un moindre intérêt. Les espèces ou variétés ne figurant pas dans la collection précédente sont : *P. Elwesii*, Hook. f., *P. sigmoidea*, Franch., *P. polyphylloides*, Bonati, *P. brevifolia*, Don, *P. Wettsteiniana*, Bonati, *P. lachnoglossa*, Hook. f., *P. lachnoglossa*, Hook. f. var. *macrantha*, Bonati, *P. rhodotricha*, Maxim., *P. Oederi*, Vahl, var. *bracteosa*, Bonati. Aucune forme du *P. Oederi*, Vahl, n'avait encore été signalée, je crois, dans la région de Likiang, le *P. stenantha*, Franch, qui n'est qu'une variété de cette espèce provient de Ta-tsien-lou.

Il est à remarquer que la plupart des espèces de cette seconde collection proviennent comme celles de la première du versant oriental de la chaîne Quelques unes, cependant, comme les *P. Elwesii* et *lachnoglossa* ont été recoltées sur le versant occidental et ce sont precisément des espèces qui ont leur centre de répartition dans la région du Yunnan voisine du Thibet et dans l'Himalaya. L'on peut donc supposer qu'une exploration plus complète du versant ouest de la chaîne de Likiang amenéra encore d'autres et très intéressants résultats.

Species Nova Addenda.

Pedicularis Dunniana, Bonati. Sp. nov. (Tristes.)

Species altissima, 90 cm. ac ultra. Caulis simplex, fistulosus, erectus, basi sparsus pilis raris albis ac crispis ; villosissimus ac summo glandulosus. Folia sessilia, auriculata, glabrescentia, ovato-acuta, 10–12 mm. longa, 15–30 mm. lata, pinnatifida ; loborum 15–20 jugis ; lobis lineato-acutis, 6–10 mm. longis, 4–6 mm. latis, pinnatilobulatis, lobulis acutidentatis. Bracteae inferiores foliaceae, superiores lanceolatae, integrae vel summo serratae, calycem aequantes vel paulo superantes. Flores inferiores subsessiles, superiores sessiles, in spica laxa ac interrupta, 15–20 mm. longa (pedunculis inferioribus 1 mm. longis). Calyx pilosus, 6–7 mm. longus dentibus 5 lineato-acutis integris vel obscure denticulatis. Corolla 25 mm. longa, tubo calyce duplo longiore, glabro ; galea sicut in *P. Prainiana*, latere ac margine villosa ; in parte inferiore 5 mm. longa ; in parte antheras ferente 10 mm. longa ; labio inferiore galeam superante (12–13 mm.) ; lobis ovato-rotundis ; margine ciliata. Staminum filamenta glabra. Capsula glabra, globosa, calycem haud superans. Semina ?

"Plant of 2–4 ft. Flowers pale yellow. Dry, shady situations in pine forests on the divide between the Lichiang and Hoching valleys. Lat. 26° 50′ N. Alt. 8000–10,000 ft. October 1910." G. Forrest. No. 7389.

Cette plante se rapproche surtout des *P. Prainiana*, Maxim, et *P. princeps*, Bur. et Franch. Elle diffère du *P. Prainiana*—

1. par sa grande taille ;
2. par son épi allongé et lâche ;
3. par son calice plus court ;
4. par le tube de la corolle deux fois plus long que le calice ;
5. par la lèvre inférieure plus longue que le casque et à lobes obtus.

Diffère du *P. Princeps* qui est également une espèce de très grande taille—

1. par ses feuilles sessiles auriculées et toutes semblables ;
2. par ses tiges et inflorescences non rameuses ;
3. par ses fleurs sessiles ou subsessiles ;
4. par le calice pileux à dents lancéolées-linéaires, aigues, entières ou obscurément dentées.

The Indigoferas of China.

BY

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SOME time ago the writer, at Professor Balfour's request, undertook the revision of the Chinese Leguminosae—with the exception of a few genera which were being, or had already been, revised by botanists making a special study of those genera—preserved in the herbarium attached to the Royal Botanic Garden, Edinburgh. Shortly afterwards, Professor C. S. Sargent offered to place at the writer's disposal most of the Leguminosae collected by Mr. E. H. Wilson during his expeditions to China under the auspices of the Arnold Arboretum. Advantage was taken of the bringing of these large collections to Kew to compare them with the copious material in that herbarium, and to revise the genera where necessary.

The first genus to be examined was *Indigofera*, and here so much unnamed material had accumulated that it was deemed advisable to go rather fully into the genus, and the results of the examination are given below in a preliminary enumeration, accompanied by an artificial key to the species enumerated. In the enumeration there are incorporated, besides the material mentioned above, the specimens preserved in the Natural History Museum, S. Kensington, permission to examine which was kindly granted by the keeper, Dr. Rendle.

In conclusion, the writer begs to acknowledge his indebtedness to Professor Sargent for allowing the descriptions of the new species collected by Wilson to be incorporated in the present paper instead of (as was originally intended) in the next part of the Plantae Wilsonianae. By this arrangement the great advantage is secured of having all the descriptions in one place.

I. DESCRIPTION OF NEW SPECIES.

Indigofera amblyantha, Craib. Sp. nov., ab *I. Pseudotinctoria*, Matsum., foliis majoribus petiolis duplo saltem longioribus suffultis distinguenda.

[Notes, R.B.G., Edin., No. XXXVI, March 1913.]

Ramuli primo pilis albis adpressis densius tecti, angulati, straminei, demum fere glabri, teretes, cortice brunneo vel pallide brunneo obtecti. *Folia* 7–9—foliolata, 9–10 cm. longa, petiolo 3–4 cm. longo ut rachi supra late canaliculato suffulta; stipulae 1.5 mm. longae; foliola opposita vel raro alterna, oblongo-elliptica, elliptica vel oblongo-obovata, apice rotundata, mucronata, basi cuneata vel late cuneata, 15–31 mm. longa, 8–17 mm. lata, pagina utraque pilis albis medifixis breviusculis parce instructa, subtus pallidiora, nervis lateralibus utrinque circiter 6 supra subconspicuis; petioluli circiter 1.5 mm. longi; stipellae minutae. *Racemi* axillares, ad 11 cm. longi, fere e basi floriferi; bracteae paulo ultra 1 mm. longae, deciduae; pedicelli 1.5 mm. longi. *Calycis* tubus 1.5 mm. longus, lobo infimo subaequilongus; lobi laterales infimo breviores, supremi breves. *Vexillum* circiter 6 mm longum, apice cochleatum; alae 6.5 mm. longae; carina alis paulo brevior.

W. Hupeh, Wilson, 3077 (Herb. Kew!).

Indigofera Balfouriana, Craib. Sp. nov., ab affini *I. Dielsiana*, Craib, calyce ejusque tubo corollaque brevioribus recedit.

Frutex 0.6–1.8 m. altus (ex Forrest); ramuli primo subadpresse crispatim pubescentes, mox glabri, cortice brunneo lenticellato obtecti. *Folia* 5–7—foliolata, 12–30 mm. longa, petiolo 5–13 mm. longo suffulta; stipulae circiter 3 mm. longae, adpresse brunneo-pubescentes; foliola elliptica vel terminalia obovata, apice rotundata vel saepius retusa, mucronata, basi late cuneata vel rotundata, 6–13 mm. longa, 4–9.5 mm. lata, pagina utraque sed subtus densius adpresse albo-pubescentia, subtus pallidiora, nervis subobscuris; petioluli ad 1.5 mm. longi; stipellae parvae. *Racemi* axillares, ad 2.5 cm. longi, pedunculo communi brevi suffulti; pedicelli ad 2 mm. longi; bracteae paulo ultra 1 mm. longae, cito deciduae. *Calycis* tubus 1 mm. longus; lobus infimus lineari-lanceolatus, acutus, 1.25 mm. longus; lobi supremi deltoidei, acutiusculi, 1 mm. longi. *Vexillum* suborbiculare, emarginulatum, subsessile, 8 mm. longum, 7 mm. latum; alae 7.25 mm. longae, 2.5 mm. latae; carnia 7 mm. longa, 2.75 mm. lata.

"Eastern flank of the Lichiang Range. Lat. 27° 10′ N. Shrub of 2–6 ft. Flowers deep rose. Dry, open situations amongst scrub. 9000–10,000 ft." Forrest, 5627 (Herb. Edinburgh!).

Indigofera Carlesii, Craib. Sp. nov., ab *I. Kirilowii*, Maxim. ex Palibin, corolla ante anthesin omnino dense breviter albo-tomentella, foliolis majoribus distinguenda.

Ramuli pilis adpressis medifixis instructi, plus minusve glabrescentes, primo angulati, mox teretes vel fere teretes. *Folia* 5–9—foliolata, 7.5–11.5 cm. longa, petiolo 1.7–2.2 cm. longo ut rachi supra canaliculato pilis medifixis adpressis hispido plus minusve glabrescente suffulta; stipulae deciduae, 1 cm. longitudine vix attingentes; foliola opposita, subelliptica vel ovato-elliptica, paulo inaequilatera, apice obtusa vel rotundata, apiculata, basi cuneata vel rotundato-cuneata, 2–5 cm. longa, 1.4–3 cm. lata, rigide chartacea, pagina utraque pilis breviusculis medifixis hispida, nervis lateralibus utrinque 6–8 supra conspicuis subtus prominentibus, nervis transversis supra conspicuis vel subconspicuis subtus prominulis; petioluli 2–4 mm. longi; stipellae conspicuae petiolulis plerumque paululo longiores. *Racemi* axillares, sub anthesin laxiusculi, folia valde superantes, ad 17 cm. longi, pedunculo communi ad 6 cm. longo ut rachi angulato pilis adpressis breviusculis medifixis laxius instructo suffulti; pedicelli 4 cm. vix attingentes, post anthesin incrassati; bracteae deciduae, circiter 2 mm. longae. *Calycis* tubus 2.5 mm. longus, lobo infimo subaequilongus. *Vexillum* subellipticum, 15.5 mm. longum, 9 mm. latum, apice rotundatum; alae carinae subaequales.

Chinkiang, Carles, 514 (Herb. Kew! Edinburgh!).

Indigofera chalara, Craib. Sp. nov., ab *I. Kirilowii*, Maxim. ex Palib., foliolis alternis, calycis lobis brevioribus latioribus distinguenda.

Suffrutex 1.8 m. altus (ex Wilson); ramuli pilis perpaucis medifixis adpressis primo instructi, mox glabri, brunneo- vel cinereo-brunneo-corticati. *Folia* 7–9—foliolata, 9.5–11 cm. longa, petiolo 1.5–2.2 cm. longo supra canaliculato ut rachi parce adpresse pubescente suffulta; stipulae cito deciduae; foliola alterna, plerumque ovata, ovato-lanceolata vel late ovata, interdum subrotundata vel terminalia obovata, apice acuta, obtusa, rotundata vel retusa, apiculata, basi plerumque parum obliqua, late cuneata, rotundata vel truncata, 1.7–3 cm. longa, 1.1–2.4 cm. lata, chartacea, pagina utraque pilis medifixis crispulis instructa, nervis lateralibus utrinque circiter 6 obscuris vel pagina superiore subconspicuis, petiolulis 1.5–3 mm. longis suffulta; stipellae filiformes, circiter 1.5 mm. longae. *Racemi* axillares, ad 10 cm. longi, pedunculo communi petiolo subaequilongo vel eo longiore suffulti; pedicelli graciles, circiter 4 mm. longi; bracteae deciduae. *Calycis* tubus ad 2 mm. longus, lobus infimus 1 mm. longus. *Vexillum* 12 mm. longum, 5.5 mm. latum; alae 10.5 mm. longae; carina 12 mm. longa.

Central China, Wilson, 1230 (Herb. Kew, coll. May 1901! Herb. Edinburgh, coll. June 1900!).

Indigofera Cooperii, Craib. Sp. nov., ob foliola mediocria numerosa, racemos elongatos floresque ad 1.5 cm. longos distincta.

Caules (vel ramuli ?) glabri, ad 15 cm. longi. *Folia* 13–17—foliolata, 8.5–10.3 cm. longa, petiolo 1.8–2 cm. longo ut rachi supra canaliculato glabro suffulta; stipulae fugaces; foliola opposita vel plerumque alterna, inaequilatera, ovato-lanceolata, oblanceolata vel elliptico-oblanceolata, infima interdum fere rotundata, apice obtusa vel rotundata, apiculata, basi cuneata vel rotundata, 7–19 mm. longa, 5–10 mm. lata, chartacea vel membranaceo-chartacea, pagina utraque pilis albidis medifixis adpressis parce instructa, nervis lateralibus utrinque circiter 6 supra obscuris subtus obscuris vel subconspicuis; petioluli circiter 1.5 mm. longi; stipellae graciles, petiolulis subaequales. *Racemi* axillares, 9–12 cm. longi, pedunculo communi 3.4–3.7 cm. longo ut rachi glabro suffulti; bracteae deciduae; pedicelli 2.5–3 mm. longi. *Calyx* 2.5 mm. longus, lobis deltoideis tubo brevioribus. *Vexillum* 14.5 mm. longum, 8 mm. latum; carina 15 mm. longa, alas paulo superans.

Ningpo, Cooper (Herb. Kew !).

Indigofera dichroa, Craib. Sp. nov., ab *I. Kirilowii*, Maxim. ex Palibin, foliolis 5 tantum densius pubescentibus recedit.

Ramuli primo pilis medifixis adpressis albis densius tecti, mox glabri, cortice viridi-stramineo obtecti, subangulati. *Folia* 5—foliolata, ad 4 cm. longa, petiolo 1.2–2 cm. longo ut rachi supra canaliculato adpresse pubescente suffulta; stipulae subulatae, 4 mm. longae; foliola opposita vel interdum inferiora alterna, elliptica, ovato-elliptica vel elliptico-obovata, basi cuneata vel rotundata, apice attenuata vel rotundata, apiculata, 10–20 mm. longa, 8–10 mm. lata, chartacea, pagina superiore pilis brevibus densius instructa, inferiore dense longiuscule adpresse pubescentia, nervis lateralibus utrinque ad 6 pagina utraque subconspicuis; petioluli ad 1.75 mm. longi; stipellae minutae. *Racemi* axillares, ad 5 cm. longi, pedunculo communi 5–9 mm. longo ut rachi densius albo-pubescente suffulti; pedicelli ad 2 mm. longi, pilis albis adpressis obtecti; bracteae deciduae. *Calycis* tubus 2 mm. longus, lobus infimus 1.5 mm. longus, 1 mm. latus. *Vexillum* elliptico-obovatum, 11.5 mm. longum, 9 mm. latum; alae vexillo aequilongae, 3 mm. latae; carina 12 mm. longa, 3.5 mm. lata, obtusa.

West Szechuan, Wilson, 3084, coll. June 1908 (Herb. Kew !).

Indigofera Dielsiana, Craib. Sp. nov., ab *I. argutidente*, Craib, calycis lobis corollaque brevioribus facile distinguenda.

Frutex 0.9–1.8 m. altus (ex Forrest); ramuli primo pilis albidis subadpressis hic illic instructi, mox glabri, cortice fusco-brunneo obtecti, angulati. *Folia* 5–9—foliolata, 2–4 cm. longa, petiolo 1–2.3 cm. longo ut ramulis rachique pauperrime pubescente suffulta; stipulae ad 6 mm. longae, breviter adpresse brunneo-pubescentes; foliola opposita, elliptica vel oblongo-elliptica, utrinque rotundata vel basi rotundato-cuneata cuneatave, apice mucronata, 8–20 mm. longa, 5–10.5 mm. lata, chartacea, pagina utraque sparse adpresse pubescentia, nervis lateralibus paucis subconspicuis; petioluli circiter 1.5 mm. longi, tenuiter pubescentes; stipellae graciles, petiolulis breviores. *Racemi* axillares, ad 5 cm. longi, pedunculo communi 5–10 mm. longo ut rachi adpresse pubescente suffulti; pedicelli graciles, 2–3 mm. longi; bracteae plerumque deciduae, vix 3 mm. longae. *Calycis* tubus 2 mm. longus, lobus infimus lanceolatus, acutus, 1.5 mm. longus. *Vexillum* ellipticum, in unguem brevem contractum, 9.5 mm. longum, 6.5 mm. latum; alae vix 9 mm. longae, 2.75 mm. latae; carina 8.5 mm. longa, 2.5 mm. lata.—*I. pendula*, Franchet, var., Diels in Notes, Edin. Bot. Gard., No. xxxiii. pp. 219, 220.

" Along the base of the eastern flank of the Tali Range. Lat. 25° 40′ N. Shrub of 3–6 ft. Flowers pale rose. Dry, open situations amongst scrub. 7000–8000 ft." Forrest, 4251. (Herb. Edinburgh !).

A shade form of this species is represented by Forrest, 4258, from the same locality at 8000–9000 ft. (Herb. Edinburgh !).

Ducloux, 817 (Herb. Kew !), is rather scrappy, but may be merely a form of this species with keel nearly 10 mm. long.

Indigofera Duclouxii, Craib. Sp. nov., ob flores 16–17 mm. longos cum foliis coaetaneos distincta.

Ramuli juventute pilis longiusculis divergentibus brunneis parce instructi, mox glabri vel subglabri, cortice brunneo vel fusco-brunneo obtecti. *Folia* 15–19—foliolata, vix matura, ad 10 cm. longa, petiolo ad 32 mm. longo indumento racheos ramulorumque juvenilium suffulta; stipulae lineares, acutae, circiter 9 mm. longae, pilis brunneis albisque immixtis laxe tectae; foliola opposita, oblonga, basi cuneato-rotundata vel rotundata, apice rotundata vel truncata, mucronata, ad 24 mm. longa et 12 mm. lata, pagina utraque, saltem statu juvenili, tenuiter laxe pilosa, nervis lateralibus obscuris, petiolulis 1 mm. longis indumento ramulorum suffulta; stipellae filiformes, ad 4 mm. longae. *Racemi* cum foliis coaetanei, ad 7 cm. longi, pedunculo ad 2 cm. longo indumento ut rachi ramulisque juvenilibus suffulti; pedicelli 3 mm. longi, brunneo-pilosi; bracteae deciduae, circiter 3.5 mm. longae. *Calycis* tubus 1.5 mm. longus, lobi ad 3 mm. longi (sub anthesin). *Vexillum* oblongo-obovatum, 17 mm.

longum, 10 mm. latum; alae 16.5 mm. longae, 4.5 mm. latae; carina 16.5 mm. longa, 5 mm. lata.

Yunnanfu, Ducloux, 706 (Herb. Kew !).

Indigofera Faberii, Craib. Sp. nov., *I. decorae*, Lindl., affinis sed carinae acumine fere 2 mm. longo recedit.

Suffrutex ramulis pilis perpaucis albidis medifixis adpressis parcissime instructis fusco-brunneo-corticatis. *Folia* 11—foliolata, petiolo 26–32 mm. longo ut rachi glabro suffulta; stipulae fugaces; foliola opposita vel subopposita, parum inaequilatera, plerumque ovata vel ovato-lanceolata, apice attenuata, mucronata, basi late cuneata, ad 25 mm. longa et 12 mm. lata, chartacea, supra glabra, subtus pilis breviusculis albidis medifixis sparse instructa, nervis lateralibus utrinque circiter 6 pagina utraque conspicuis, nervulis uti reticulatione gracili subtus tantum conspicuis; petioluli circiter 2.5 mm. longi; stipellae graciles, ad 4 mm. longae. *Racemi* in exemplo altero axillares, in altero in ramulo aphyllo alternatim dispositi, ad 11 cm. longi, pedunculo 22–30 mm. longo suffulti; pedicelli ad 4 mm. longi, ut rachis glabri; bracteae deciduae. *Calycis* tubus 1.5 mm. longus, lobus infimus 1 mm. longus. *Vexillum* 11.5 mm. longum, 5.5–7 mm. latum; alae 12 mm. longae, 1.75 mm. latae; carina acuminata, 13.5 mm. (acumine incluso) longa.

Chekiang Province: Tien Tai Mountains, about 300 m., Faber, 243 (Herb. Kew !).

Indigofera Forrestii, Craib. Sp. nov., *I. cinerascenti*, Franchet, habitu similis sed indumento tenuiore, carina vix acuminata distinguenda.

Fruticulus 45–60 cm. altus (ex Forrest); caules primo adpresse breviter pubescentes, mox glabri vel fere glabri, angulati, pallide brunneo-corticati. *Folia* plerumque 11–13—foliolata, rarius 15, rarissime tantum 5—foliolata, ad 6 cm. longa, petiolo 8–12 mm. longo ut rachi supra sicco anguste canaliculato suffulta; stipulae circiter 1.5 mm. longae; foliola opposita, anguste elliptica vel terminalia fere cuneata, apice rotundata vel terminalia truncato-retusa, omnia breviter mucronata, basi rotundata vel cuneato-rotundata, 6–11 mm. longa, 4–6 mm. lata, firma, pagina utraque sed superiore crassius adpresse albo-pubescentia, costa supra sicco impressa subtus prominente, nervis lateralibus obscuris, petiolulis circiter 1 mm. longis suffulta; stipellae parvae. *Racemi* axillares, densi, ad 7 cm. longi, pedunculo communi plerumque petiolo distincte longiore rarius eo breviore suffulti; bracteae circiter 1 mm. longae; pedicelli bracteis subaequilongi. *Calyx* 2 mm. vix excedens; lobi deltoidei, acuti, supremi breves, infimo tubo subaequali. *Vexillum* ellipticum, sessile, apice breviter apiculatum, 6.5 mm. longum, fere 5 mm. latum; alae fere 6.5 mm. longae, 2 mm. latae; carina obtusa, 6.25 mm. longa, 2 mm. lata.

"Eastern flank of the Tali Range. Lat. 25° 40′ N. Dwarf shrub of 1½–2 ft. Flowers deep purplish-rose, interior darkest. Stony pasture and on ledges of cliffs. Alt. 8000–9000 ft." Forrest, 7000 (Herb. Edinburgh !).

Indigofera Fortunei, Craib. Sp. nov., ab *I. venulosa*, Champion, foliolis glabris nisi juvenilibus pilis perpaucis cito deciduis margine inferne costaque infra instructis distinguenda.

Fruticulus circiter 30 cm. altus (ex Fortune), caule erecto glabro tenuiter angulato brunneo-corticato ad 3 mm. diametro. *Folia* 7–15—foliolata, 6–10 cm. longa, petiolo 2–3 cm. longo glabro suffulta; stipulae deciduae, 3.5 mm. longae; foliola plerumque opposita sed interdum alterna, ovato-lanceolata vel ovato-elliptica, inaequilatera, apice obtusa vel rotundata, apiculata, basi rotundata vel cuneato-rotundata, 15–22 mm. longa, 9–16 mm. lata, rigida, glabra nisi primo pilis perpaucis medifixis cito deciduis margine inferne costaque infra instructa, nervis lateralibus utrinque 6–8 cum nervulis supra conspicuis subtus prominulis, petiolulis 2 mm. longis suffulta; stipellae conspicuae, petiolulos subaequantes. *Racemi* axillares, ad 13 cm. longi, pedunculo communi ad 3 cm. longo suffulti; pedicelli 3 mm. longi; bracteae deciduae. *Calycis* tubus 2 mm. longus, lobus infimus circiter 1.5 mm. longus. *Vexillum* 10–11 mm. longum, 6–9.5 mm. latum, apice emarginulatum; alarum lamina 6.5 mm. longa, 2.5 mm. lata, ungui 3.5 mm. longo vix 1.5 mm. lato adjecto; carina 11.5 mm. longa, 4 mm. lata. *Ovarium* 5 mm. altum, glabrum.

China, Fortune, 43 ex Herb. Benth., sine numero ex Herb. Hook. (Herb. Kew !).

Indigofera Hancockii, Craib. Sp. nov., *I. cinerascenti*, Franchet, habitu persimilis sed partibus junioribus pilis medifixis et albidis et brunneis haud albidis tantum vestitis, carina haud vel brevissime acuminata distinguenda.

Caules primo pilis medifixis albidis cum brunneis immixtis adpressis dense vestiti, mox glabri vel fere glabri, cortice rubro-brunneo obtecti. *Folia* 4–5 cm. longa, 9–17—foliolata, petiolo circiter 9 mm. longo suffulta, petiolo rachique ut caulibus pubescentibus supra canaliculatis vel obscure canaliculatis; stipulae parvae, cito deciduae; foliola opposita, plerumque oblongo-obovata vel terminalia obovata, apice rotundata vel retusa, mucronulata, basi cuneata, 0.7–1 cm. longa, 3.5–6 mm. lata, coriacea, costa pagina superiore immersa, inferiore prominente, nervis lateralibus omnino obscuris, utrinque pilis albidis brunneisque rigidis adpressis medifixis scabrida, petiolulis 1–1.5 mm. longis suffulta; stipellae minutae. *Racemi* axillares, folia superantes, pedunculo communi petiolos subaequante suffulti, densiusculi; pedicelli 1–1.5 mm. longi; bracteae inconspicuae, cito deciduae. *Calyx* 2 mm. longus; lobi deltoidei, acutiusculi, infimo tubo vix aequilongo. *Vexillum* oblongum, apice rotundatum, sessile, 7.25 mm. longum, 5 mm. latum; alae 6 mm. longae, 1.5 mm. latae; carina 7 mm. longa, 2.5 mm. lata, brevissime vel vix acuminata.

Yunnan: Mengtze, 1500–1950 m., Hancock, 332 (Herb. Kew!).

Indigofera Henryi, Craib. Sp. nov., ab affini *I. cinerascente,* Franchet, pedicellis sub anthesin 5 mm. longis facile distinguenda.

Suffruticulus circiter 30 cm. altus (ex Henry); ramuli pilis albis medifixis adpressis parce instructi, angulati, brunneo- vel pallide brunneo-corticati. *Folia* 17–21—foliolata, 4–8 cm. longa, petiolo 5–8 mm. longo supra planiusculo suffulta, racheos nodis ob internodios inferne contractos quasi-articulatis, internodiis ex infra visis subalatis superioribus supra distincte canaliculatis, rachi petioloque sparse adpresse albo-pubescentibus; stipulae 5 mm. longae; foliola parum inaequilatera, oblonga, apice plerumque rotundata, mucronata, basi late cuneata, rotundata vel truncata, 11–23 mm. longa, 5–9 mm. lata, pagina utraque pilis albis medifixis instructa, pilis supra breviusculis subtus longioribus sparsioribus, nervis lateralibus utrinque 4–6 pagina utraque subconspicuis; petioluli circiter 1 mm. longi; stipellae graciles, petiolulos paulo superantes. *Racemi* axillares, folia subaequantes vel iis breviores, pedunculo communi petiolis paulo longiore adjecto; pedicelli sub anthesin 5 mm. longi, in fructu ad 9 mm. longi; bracteae deciduae, circiter 2 mm. longae. *Calycis* tubus 1.5 mm. longus, lobi deltoidei, acuti, infimus 1.5 mm. longus, 1.25 mm. latus, ceteri paulo breviores. *Vexillum* obovatum, apice rotundatum, circiter 9 mm. longum et 6 mm. latum; alae 9.5 mm. longae, 2.75 mm. latae; carina obtusa, 8 mm. longa. *Ovarium* 4.5 mm. altum, glabrum.

Yunnan: Mengtze, on rocky mountains, 1950 m., Henry, 10050*a* (type—Herb. Kew! Edinburgh!), Henry, 10050*b* (Herb. Kew!).

Indigofera Henryi, Craib, var. **silvarum,** Craib, var. nov., ab *I. Henryi*, Craib, inflorescentia insigniter laxa, pedicellis longis distincta.

Ramulus (caulisve?) gracilis, parum flexuosus, primo leviter angulatus, mox teres, pallide brunneo-corticatus. *Folia* erecto-patentia, 17–19—foliolata, 9–10 cm. longa, rachi supra planiuscula vel leviter canaliculata, infra convexa et subalata; petiolus 8–10 mm. longus; stipulae mox deciduae, conspicuae, divaricatae, filiformes, ad 4 mm. longae; foliola opposita, lateralia plerumque oblonga, interdum, inferiora praecipue, ovato-elliptica, basi rotundata, inaequalia, apice rotundata vel subrotundata, terminalia basi cuneata, apice rotundata vel truncata, omnia apiculo tenui circiter 1.25 mm. longo instructa, 10–21 mm. longa, 7–11 mm. lata, chartacea, pagina superiore pilis brevibus medifixis sparse instructa, inferiore pilis albidis rigidioribus longioribus hic illic instructa, costa subtus prominente, nervis lateralibus utrinque 4–5 haud semper subtus conspicuis; petioluli 1–1.25 mm. longi; stipellae parvae. *Racemi* axillares, foliis plerumque breviores vel iis interdum subaequales, laxi, pedunculo communi petiolo plerumque duplo longiore suffulti; bracteae post anthesin persistentes, 2 mm. longae; pedicelli graciles, 8–9 mm. longi. *Flores* iis *I. Henryi* subsimiles.

Yunnan: Mengtze, in wooded glens, 1500–1800 m., Hancock, 368 (Herb. Kew!).

Indigofera Hosiei, Craib. Sp. nov., ab affini *I. Bungeana*, Walp., floribus parum longioribus, calycis lobis multo longioribus facile distinguenda.

Ramuli primo pilis albidis medifixis adpressis dense vestiti, dein glabri, brunneo-corticati, ad 4–4.5 mm. diametro. *Folia* 7-foliolata, 3 cm. longitudine vix attingentia, petiolo ad 1 cm. longo adjecto, petiolo rachique supra plus minusve canaliculatis; stipulae parvae, ramulis adpressae, deciduae; foliola opposita, plerumque oblongo-elliptica vel oblonga, apice rotundata vel parum retusa, mucronulata, basi inaequalia, rotundata vel late cuneata, 7–8 mm. longa, 4.5–6 mm. lata, tenuiter chartacea, supra fusca, subtus viridia, costa subtus prominente, nervis lateralibus obscuris, pagina superiore pilis medifixis tenuioribus albidis parce instructa, inferiore pilis medifixis rigidioribus albidis hic illic ornata; petioluli circiter 0.5 mm. longi; stipellae deficientes. *Racemi* axillares, ad 7 mm. longi, pedunculo communi petiolo subaequali vel eum paulo superante suffulti; pedicelli circiter 1 mm. longi; bracteae deciduae. *Calycis* tubus 1.5 mm. longus, lobi filiformes, ad 2 mm. longi. *Vexillum* late obovatum, 6 mm. longum, 4 mm. latum; alae carinae aequilongae, 5.5 mm. longae.

Kansu or Shensi, Hosie, 1 (Herb. Kew!).

Indigofera ichangensis, Craib. Sp. nov., ab affini *I. Carlesii*, Craib, ramulis foliorumque rachi glabris vel fere glabris recedit.

Ramuli teretes, glabri vel fere glabri, primo plus minusve straminei, mox brunneo- vel fusco-corticati, striati. *Folia*

9–13—foliolata, 15–22 cm. longa, petiolo 2–15 mm. longo adjecto; foliola opposita vel inferiora alterna, ovato-lanceolata, ovata ad obovata, basi cuneata vel rotundato-cuneata, apice subacuta vel rotundata, mucronata, 2–7 cm. longa, 1.2–4.2 cm. lata, pagina utraque pilis albis medifixis breviusculis tenuiter instructa, chartacea, nervis lateralibus utrinque circiter 6 supra conspicuis subtus prominulis, nervulis supra conspicuis subtus subprominulis; petioluli 2–3 mm. longi; stipellae parvae. *Racemi* axillares, folia subaequantes, pedunculo communi 2.5–4 cm. longo ut rachi glabro suffulti; pedicelli graciles, 2.5 mm. longi; bracteae parvae, deciduae. *Calycis* tubus circiter 1.5 mm. longus, lobus infimus deltoideus, acutus, circiter 1 mm. longus, lateralibus paululo longior. *Vexillum* oblongum, fere 12 mm. longum, 7 mm. latum, ungui fere 1.5 mm. longo suffultum; alae ad 13 mm. longae et 2 mm. latae; carina ad 13.5 mm. longa, 3.5 mm. lata.

Hupeh: Ichang, Henry, 3512 (Herb. Kew! Edinburgh!).

Indigofera Kirilowii, Maxim. ex Palibin, var. **coreana,** Craib, var. nov., a typo racemis folia superantibus, calyce longiore, lobis angustioribus recedit.

Caulis rectus, ad 44 cm. altus, primo pilis albidis medifixis adpressis hic illic parcissime instructus, ad 3 mm. diametro. *Folia* 7–11—foliolata, 6.5–10 cm. longa, petiolo 1.5–2 cm. longo indumento ut caule rachique suffulta; stipulae circiter 8 mm. longae; foliola opposita vel rarissime alterna, inaequilatera, ovato-elliptica vel subelliptica interdum subrotundata, apice acutiuscula, obtusa vel rotundata, mucronata, basi late cuneata vel rotundata, 20–26 mm. longa, 11–20 mm. lata, chartacea, pagina utraque pilis albis breviusculis medifixis, superiore densius, instructa, nervis lateralibus utrinque 4–6 supra obscuris subtus subprominulis, costa supra immersa subtus prominula, nervis transversis uti reticulatione gracili subtus subconspicuis; petioluli circiter 2–2.5 mm. longi; stipellae ad 2.5 mm. longae. *Racemi* axillares, foliis circiter duplo longiores; pedunculus communis petiolo longior; pedicelli graciles 2.5–3 mm. longi; bracteae deciduae, 2 mm. longae. *Calycis* tubus ad 2 mm. longus, lobo infimo subaequilongus. *Vexillum* late oblongum, apice rotundatum, 17 mm. longum, 11 mm. latum; alae 17 mm. longae, 5 mm. latae; carina 17 mm. longa.

Corea: Chemulpo, Carles, 173 (Herb. Kew! Edinburgh!); West Coast, 39° N. Perry, 22 (Herb. Kew!).

Indigofera lenticellata, Craib. Sp. nov., ab *I. Hosiei*, Craib, calycis lobis brevioribus recedit.

Fruticulus 30–60 cm. altus (ex Wilson); ramuli primo pilis albis adpressis medifixis tecti, mox glabri, cortice rubro-brunneo lenticellato obtecti. *Folia* 5-9—foliolata, 8-20 mm. longa, petiolo 3-6 mm. longo suffulta ; stipulae circiter 1.5 mm. longae ; foliola opposita, elliptica ad obovata, apice rotundata vel truncata, breviter mucronata, basi rotundata vel cuneato-rotundata, ad 7 mm. longa et 5 mm. lata, rigida, pagina utraque pilis albidis densius tecta, nervis obscuris, breviter petiolulata ; stipellae minutae. *Racemi* axillares, ad 27 mm. longi ; pedicelli breves ; bracteae parvae, deciduae. *Calycis* tubus ad 1 mm. longus ; lobus infimus late lanceolatus, acutiusculus, tubo subaequalis. *Vexillum* oblongum, 6.5 mm. longum, 4 mm. latum ; alae vexillo aequilongae, 2 mm. latae ; carina fere 7 mm. longa, 2.25 mm. lata.

Western China : Min Valley, Wilson, 3386 (Herb. Kew !).

Indigofera mengtzeana, Craib. Sp. nov., ab *I. sensitiva,* Franchet, stipulis circiter 3 mm. longis, stipellis parvis vel minutis, bracteis vix conspicuis distinguenda.

Suffrutex 1.5 m. altus (ex Henry) ; ramuli primo pilis medifixis albidis adpressis parce instructi, plus minusve glabrescentes, conspicue nodosi, ad 3 mm. diametro. *Folia* 13-17—foliolata, 4-7 cm. longa, petiolo 15-20 mm. longo ut rachi supra canaliculato pilis albis medifixis brevibus adpressis parcius instructo suffulta ; stipulae graciles, circiter 3 mm. longae ; foliola opposita, anguste oblonga, oblonga vel elliptico-oblonga vel terminalia oblongo-obovata, apice rotundata, breviter mucronata, basi cuneata, late cuneata vel rotundata, 5-13 mm. longa, 3.5-6 mm. lata, chartacea, supra glabra, subtus pilis albis medifixis parce instructa, nervis lateralibus obscuris vel subobscuris, petiolulis gracilibus 1 mm. longis suffulta ; stipellae parvae vel minutae. *Racemi* axillares, confertiflori, ad 3.5 cm. longi ; pedicelli graciles, sub anthesin circiter 1 mm. longi ; bracteae deciduae, pedicellis paulo longiores. *Calycis* tubus 1.5 mm. longus ; lobi lanceolati, acuti, infimo tubo paulo longiore. *Vexillum* late ellipticum, 6.5 mm. longum, 5 mm. latum ; alae 6.5 mm, longae, 2 mm. latae ; carina 6.5 mm. longa, 2.5 mm. lata. *Legumen* ad 24 mm. longum.

Yunnan : Mengtze woods, 1650 m., Henry, 10627 (type —Herb. Kew ! Edinburgh !). Yunnansen, Maire, 1978 (Herb. Edinburgh ! Kew !).

Indigofera Monbeigii, Craib. Sp. nov., ab affini *I. rigioclada,* Craib, stipulis longioribus facile distinguenda.

Ramuli primo adpresse pubescentes, plus minusve glabrescentes, brunneo- vel fusco-brunneo-corticati, striati, ad 4 mm. diametro. *Folia* 7-11—foliolata, 2.5-6.5 cm. longa, petiolo ad 1 cm. longo ut rachi adpresse pubescente supra canaliculato suffulta; stipulae subulatae, circiter 4 mm. longae, pubescentes; foliola opposita, oblonga, elliptico-oblonga vel terminalia oblanceolata vel late oblanceolata, basi cuneata vel late cuneata, apice plerumque rotundata, mucronata, 7–17 mm. longa, 3–7.5 mm. lata, chartacea, pagina utraque tenuiter adpresse albo-pubescentia, nervis lateralibus obscuris, petiolulis circiter 1 mm. longis suffulta; stipellae parvae. *Racemi* axillares, ad 3.5 cm. longi, breviter pedunculati; bracteae deciduae; pedicelli circiter 2 mm. longi, ut rachis adpresse albo-pubescentes. *Calycis* tubus 1.5 mm. longus; lobi lanceolati, acuti, infimo reliquis paululo longiore 2.25 mm. longo, 0.75 mm. lato. *Vexillum* oblongo-ellipticum, sessile, 10.5 mm. longum, 6 mm. latum; alae vexillum vix aequantes; carina 10 mm. longa, 2.5 mm. lata.

S.W. China, Monbeig (Herb. Kew !). N.W. Yunnan, Monbeig, 67 (Herb. Edinburgh !).

Indigofera Myosurus, Craib. Sp. nov., ab affini *I. Cooperii*, Craib, foliorum rachi pedicellis racemorumque rachi sparse adpresse brunneo-pubescentibus, calycis lobis longioribus recedit.

Fruticulus 60 cm. altus (fide Wilson); ramuli primo angulati, pilis brunneis medifixis adpressis hic illic instructi, mox glabri, fere teretes, ad 2.5 mm. diametro. *Folia* 9–19—foliolata, petiolo 5–9 mm. longo ut rachi supra canaliculato pilisque brunneis medifixis sparse instructo suffulta; stipulae circiter 5 mm. longae; foliola opposita, oblonga, oblanceolata vel obovato-oblanceolata, apice obtusa vel rotundata, mucronata, basi parum inaequalia, cuneata vel late cuneata, 10–19 mm. longa, 3.5–7.5 mm. lata, rigide chartacea, pagina utraque pilis albidis medifixis sparse instructa, nervis lateralibus utrinque 4–6 supra obscuris subtus subprominulis; petioluli circiter 1 mm. longi; stipellae graciles, petiolulis subaequilongae. *Racemi* axillares, ad 8 cm. longi, pedunculo communi 10–18 mm. longo suffulti; pedicelli graciles, ad 6 mm. longi; bracteae sub anthesin persistentes, circiter 2.5 mm. longae. *Calycis* tubus 1.75 mm. longus, lobus infimus 2.5 mm. longus. *Carina* 1 cm. longa, alis subaequalis.

W. China, Wilson, 3382 (Herb. Kew !).

Indigofera Pampaniniana, Craib. Sp. nov., ab *I. Duclouxii*, Craib, cui affinis, indumento partium omnium densiore, foliolorum nervis vix obscuris, floribus minoribus distinguenda.

Fruticulus 20–30 cm. altus (ex Maire); ramuli novelli pilis brunneis vel brunneis albisque immixtis divergentibus instructi, mox glabri, brunneo-corticati. *Folia* 9–17—foliolata, petiolo communi ad 22 mm. longo indumento ut rachi ramulisque juvenilibus suffulta; stipulae lineari-lanceolatae, 7–8 mm. longae; foliola oblonga, utrinque rotundata, apice mucronata, ad 23 mm. longa et 10 mm. lata, pagina utraque laxe tenuiter pilosa, nervis lateralibus utrinque circiter 6 supra obscuris subtus cum nervis transversis conspicuis; petioluli vix 2 mm. longi; stipellae filiformes, 3 mm. longae. *Racemi* axillares, ad 5 cm. longi, pedunculo communi 15–20 mm. longo indumento ut rachi ramulisque suffulti; pedicelli 3–4 mm. longi; bracteae deciduae, 2.5–3 mm. longae. *Calycis* tubus 2.5 mm. longus; lobus infimus lanceolatus, acutus, tubo aequilongus; lobi laterales late lanceolati, supremi fere deltoidei. *Vexillum* 13 mm. longum, 8 mm. latum; alae 12 mm. longae; carina sub anthesin haud visa.

Yunnansen, Maire, 2427 (Herb. Edinburgh! Kew!), 1602, 818 (Herb. Edinburgh!).

Indigofera Parkesii, Craib. Sp. nov., habitu *I. venulosae,* Champion, similis sed caulibus juventute breviter tomentellis, foliolis pagina utraque pubescentibus differt.

Caulis (ramulusve?) flexuosus, primo breviter tomentellus, mox breviter crispatim pubescens, ad 2.5 mm. diametro. *Folia* 11–13—foliolata, ad 10 cm. longa, petiolo 7–9 mm. longo ut rachi breviter crispatim pubescente suffulta; stipulae ad 8 mm longae; foliola opposita vel superiora alterna, inaequilatera, plerumque elliptica vel elliptico-rotundata vel terminalia fere obovata, apice plerumque rotundata, mucronata, basi rotundata, truncata vel subcordata, 13–25 mm. longa, 10–18 mm. lata, rigide chartacea, supra pilis medifixis albidis sparse instructa, subtus pallidiora, pilosula, nervis lateralibus utrinque 6 intra marginem arcuatis supra subobscuris subtus prominentibus, nervis transversis subtus prominulis, petiolulis brevibus suffulta; stipellae conspicuae, rigidae, ad 3.5 mm. longae. *Racemi* axillares, foliis plerumque breviores, pedunculo communi petiolo longiore indumento ut rachi cauleque suffulti; pedicelli 2–2.5 mm. longi; bracteae plus minusve persistentes, 3–4 mm. longae. *Calycis* tubus lobo infimo subaequilongus, 1.5 mm. longus. *Vexillum* 13 mm. longum, 5.5 mm. latum; alae 12 mm. longae; carina acuminata, 14 mm. longa.

China (without definite locality). Parkes (Herb. Kew!).

Indigofera pendula, Franchet, forma **umbrosa,** Craib, forma nov., a typo statura minore (ex Forrest), foliis longioribus, calycis lobis brevioribus latioribus recedit.

"Damp, shady pine forests on the eastern flank of the Lichiang Range. Lat. 27° 30′ N. 11,000 ft." Forrest, 2431 (Herb. Edinburgh!).

Indigofera Potaninii, Craib. Sp. nov., ab affini *I. szechuensi*, Craib, corolla breviore, stipulis longioribus facile distinguenda.

Ramuli primo dense adpresse albo-pubescentes, mox glabri vel subglabri, cortice rubro-brunneo obtecti, ad 2 mm. diametro. *Folia* 5–9—foliolata, ad 4.5 cm. longa, petiolo 13–20 mm. longo ut rachi supra canaliculato pilisque albis medifixis adpressis tecti; stipulae subrigidae, vix 4 mm. longae; foliola opposita, oblonga vel obovato-oblonga, apice rotundata, mucronata, basi cuneata vel late cuneata, ad 15 mm. longa et 6.5 mm. lata, pagina utraque pilis medifixis albis instructa, nervis lateralibus cum nervis transversis supra obscuris subtus conspicuis vel subconspicuis, petiolulis circiter 1 mm. longis suffulta; stipellae petiolulis dimidio breviores. *Racemi* axillares, ad 13 cm. longi, pedunculo communi ad 25 mm. longo suffulti; bracteae circiter 1.5 mm. longae, deciduae; pedicelli circiter 1.5 mm. longi, pilis albis medifixis obtecti. *Calyx* 2.5 mm. longus, lobo infimo tubo paulo longiore. *Vexillum* 8 mm. longum, 5 mm. latum; alae carinaque delapsae. *Legumen* ad 3.5 cm. longum, valvis brunneis subglabris; semina ambitu oblonga, straminea vel brunneo-straminea, ad 3.5 mm. longa.

West Kansu, Potanin, anno 1885 (Herb. Kew !).

Indigofera rigioclada, Craib. Sp. nov. ab *I. elliptica*, Roxb., alabastris puberulis, foliolis minoribus recedit.

Fruticulus procumbens, 30–60 cm. altus (ex Forrest); ramuli primo tenuiter adpresse pubescentes, mox glabri, brunneo-corticati. *Folia* ad 1.7 cm. longa, 5–11—foliolata, petiolo ad 5 mm. longo suffulta; stipulae circiter 1 mm. longae; foliola opposita, oblonga, utrinque rotundata apice mucronata, ad 8 mm. longa et 3.5 mm. lata, rigida, pagina utraque pilis adpressis medifixis albidis cum ferrugineis immixtis instructa, nervis obscuris, breviter petiolulata; stipellae minutae. *Racemi* axillares, ad 5 cm. longi, breviter pedunculati; bracteae pedicellis subaequales, deciduae; pedicelli circiter 2 mm. longi, ut rachis adpresse pubescentes. *Calycis* tubus 1.5 mm. longus, lobus infimus 2 mm. longus. *Vexillum* 11 mm. longum, 7.5 mm. latum; alae fere 10 mm. longae, 2 mm. latae; carina alis subaequalis, 3 mm. lata, obtusa.

"Eastern flank of the Lichiang Range. Lat. 27° 10′ N. Procumbent shrub of 1–2 ft. Flowers rich rose-red. Dry, stony situations amongst scrub and dwarf pine. 9000–10,000 ft." Forrest, 2099 (type—Herb. Edinburgh ! Kew !).

"Side valleys on the eastern flank of the Tali Range. Lat. 25° 40′ N. Shrub of 3–4 ft. Flowers greyish rose. Open situations amongst scrub. 8000–9000 ft." Forrest, 4235 (Herb. Edinburgh !).

"Eastern flank of the Lichiang Range. Lat. 27° 15′ N. Prostrate shrub of 9–18 inches. Flowers deep rose. Dry, rocky situations. 10,000–11,000 ft." Forrest, 5633 (Herb. Edinburgh !).

Tatsienlu, Pratt, 290 (Herb. Kew !).

Indigofera Souliei, Craib. Sp. nov., ab *I. Henryi*, Craib, foliolorum indumento e pilis longioribus tenuioribus constituto facile distinguenda.

Ramuli primo pilis brunneis densius tecti, mox glabri, cortice brunneo reticulato-striato obtecti. *Folia* 7–13—foliolata, 3–5 cm. longa, petiolo 4–11 mm. longo ut rachi adpresse brunneo-pubescente suffulta; stipulae lanceolatae, acutae, circiter 4 mm. longae, pubescentes; foliola opposita, elliptica vel subelliptica, apice emarginata vel subrotundata, mucronata, basi cuneata vel rotundato-cuneata, 9–19 mm. longa, 4.5–12 mm. lata, chartacea, pagina utraque pilis tenuibus longiusculis instructa, subtus pallidiora, nervis lateralibus obscuris, petiolulis circiter 2 mm. longis suffulta; stipellae petiolulis breviores. *Racemi* ad 15 cm. longi, pedunculo communi 10–12 mm. longo ut rachi pubescente suffulti; bracteae deciduae; pedicelli graciles, ad 4 mm. longi. *Calycis* tubus 1.5 mm. longus, lobus infimus tubo paululo longior. *Vexillum* 9.5 mm. longum, 4.5 mm. latum; alae maturae mancae tantum visae; carina 8.5 mm. longa, breviter acuminata. *Ovarium* pubescens.

Tatsienlu, Soulie, 870 (Herb. Kew !).

Indigofera sticta, Craib. Sp. nov., ab *I. reticulata*, Franchet, foliolis 3–5 tantum haud reticulatis, stipulis stipellisque minoribus distinguenda.

Suffrutex caulibus erectis simplicibus ad 23 cm. altis angulatis pilis brunneis medifixis maculatis cortice stramineo obtectis. *Folia* 3–5—foliolata, ad 4 cm. longa, petiolo 11–20 mm. longo ut rachi supra canaliculato pilis brunneis medifixis adpressis maculato suffulta; stipulae ad 3.5 mm. longae; foliola opposita, elliptica vel late elliptica, utrinque rotundata, apice mucronata, ad 25 mm. longa et 17 mm. lata, pagina utraque pilis medifixis adpressis, sed margine costaque subtus densius, instructa, nervis lateralibus utrinque 5–6 supra subconspicuis subtus conspicuis, petiolulo ad 2 mm. longo suffulta; stipellae parvae vel minutae. *Racemi* ad 5 cm. longi, pedunculo communi 12–32 mm. longo suffulti; bracteae deciduae, ad 2 mm. longae; pedicelli sub anthesin fere 3 mm. longi. *Calycis* tubus circiter 1.75 mm. longus; lobus infimus fere 2.5 mm. longus. *Alabastra* 8 mm. longa; flores expansi haud visi.

Yunnan: Mengtze, 1800 m., Henry, 13720 (Herb. Kew !).

Indigofera subnuda, Craib. Sp. nov., ab affini *I. Fortunei*, Craib, floribus minoribus recedit.

Caules (ramulive ?) glabri. *Folia* 9–11—foliolata, vix matura, ad 7 cm. longa, petiolo 3–4 cm. longo glabro suffulta, rachi glabra supra, apicem versus praecipue, canaliculata; stipulae deciduae, 3.5 mm. longae; foliola opposita, subelliptica vel ovato-elliptica, utrinque pedetentim angustata vel basi rotundata, apice mucrone ad 1.5 mm. longo ornata, ad 18 mm. (mucrone excluso) longa et 9 mm. lata, pagina utraque glabra nisi juventute pilis paucis albis adpressis margine et costa subtus instructa, nervis lateralibus utrinque circiter 6 supra subconspicuis subtus prominulis, nervis transversis uti reticulatione gracili subtus conspicuis; petioluli ad 2 mm. longi; stipellae graciles, petiolulos superantes. *Racemi* axillares, ad 7 cm. longi, pedunculo communi ad 3 cm. longo suffulti; bracteae deciduae, circiter 1 mm. longae; pedicelli circiter 2 mm. longi. *Calycis* tubus 1.5 mm. longus, lobi 1 mm. vix attingentes. *Vexillum* 8.5–9 mm. longum, 6–7.5 mm. latum; alae 8 mm. longae, 2 mm. latae; carina 8.5 mm. longa, 2.75 mm. lata.

Hills near Shanghai, Carles, 17th April 1887 (Herb. Edinburgh !).

Evidently the same species is represented by Carles, 57, from Hoochow (Herb. Edinburgh !), but the specimen is without any expanded flower, and has stipules measuring 9 mm. long and 2.5 mm. broad.

Indigofera szechuensis, Craib. Sp. nov., ab *I. rigioclada*, Craib, floribus minoribus distinguenda.

Ramuli primo pilis medifixis albidis brunneisve adpressis densius tecti, mox glabri, cortice brunneo lenticellato obtecti, ad 2.5 mm. diametro. *Folia* 9–11—foliolata, 2.2–4.6 cm. longa, petiolo 5–11 mm. longo ut rachi supra canaliculato parceque adpresse pubescente suffulta; stipulae lanceolatae, acutae, ad 2 mm. longae; foliola opposita, elliptica ad obovata, basi rotundata vel cuneata, apice retusa, breviter mucronata, 5–12 mm. longa, 4–8 mm. lata, chartacea, pagina utraque pilis medifixis rigidiusculis strigosa, subtus pallidiora, nervis lateralibus supra obscuris subtus subconspicuis; petioluli graciles, circiter 1 mm. longi; stipellae haud conspicuae. *Racemi* axillares, ad 5 cm. longi, pedunculo communi 8–27 mm. longo ut rachi adpresse pubescente suffulti; pedicelli circiter 1 mm. longi; bracteae pedicellis subaequales, deciduae. *Calyx* fere 1.75 mm. longus; lobi late lanceolati, acutiusculi, inter se subaequales, circiter 1 mm. longi. *Vexillum* fere 9 mm. longum, 8 mm. latum; alae 9.5 mm. longae, 3.5 mm. latae; carina 9.5 mm. longa, 2.5 mm. lata.

Western Szechuan, Wilson, 3075*a*, coll. May 1908 (Herb. Kew !).

Indigofera Wilsonii, Craib. Sp. nov., ab *I. rigioclada*, Craib, et *I. Monbeigii*, Craib, stipulis corollaque longioribus distinguenda.

Ramuli primo adpresse pubescentes, plus minusve glabrescentes, cortice pallido vel brunneo lenticellato obtecti. *Folia* 7–11—foliolata, 3–5 cm. longa, petiolo 5–14 mm. longo ut rachi supra canaliculato parceque adpresse pubescente suffulta; stipulae subulatae, circiter 7 mm. longae; foliola opposita, rarissime subopposita, plerumque oblongo-elliptica vel elliptica, utrinque rotundata vel terminalia basi late cuneata, omnia apice breviter mucronata, ad 16 mm. longa et 10 mm. lata, pagina utraque pilis rigidiusculis albis medifixis scabrida, nervis obscuris, petiolulis 1 mm. longitudine vix attingentibus suffulta; stipellae filiformes, petiolulis breviores. *Racemi* axillares, ad 5 cm. longi, pedunculo communi ad 3.3 cm. longo subterete suffulti; bracteae sub anthesin persistentes, ad 3.5 mm. longae; pedicelli circiter 3 mm. longi. *Calycis* tubus 2.5 mm. longus; lobus infimus lanceolatus, acutus, 3 mm. longus. *Vexillum* obovatum, 14 mm. longum, 8 mm. latum; alae 14.5 longae, 3.75 mm. latae; carina 15 mm. longa, 4.75 mm. lata.

West Szechuan, Wilson, 3074, coll. May 1908 (Herb. Kew !).

II. ENUMERATION OF SPECIES.

1. **Indigofera linifolia,** Retz. Obs. iv, 29 (1786); Baker in Hook. fil. Fl. Brit. Ind. ii, 92 (1876); Franchet Pl. Delavay. 153 (1889).

Yunnan: margins of roads to Kiang-yn, Delavay, 1972.

2. **Indigofera trifoliata,** Linn. Cent. Pl. ii, 29 (1756) et Amoen. Acad. iv, 327 (1759); Baker in Hook. fil. Fl. Brit. Ind. ii, 96 (1876); Forbes et Hemsl. in Journ. Linn. Soc. xxiii, 157 (1886); Franchet Pl. Delavay. 153 (1889); Diels in Engler Jahrb. xxix, 411 (1900); Dunn et Tutcher Fl. Kwangtung in Kew Bull. Add. Ser. x, 75 (1912).

Yunnan: Tapintze, Delavay, 2255; Mengtze, Henry, 9347, 9347*a*; Yunnanfu, Ducloux, 771.

Kweichau: Tchai-choui-lo, Esquirol, 1983.

Kwangtung: Ford, 28; near Canton, August 1864, Herb. Hance, 5685 et September 1869, Sampson in Herb. Hance, 5685.

Hupeh: Ichang, Henry, 683, 999, 4389, 4389*a*.

3. **Indigofera sericophylla,** Franchet Pl. Delavay. 155 (1889).

Yunnan: near Tapintze, above Che-tong, Delavay, 2569.

4. **Indigofera dolichochaete,** Craib, nom. nov.

I. mollis, Franchet Pl. Delavay. 156 (1889) *non* Ecklon et Zeyher (1834).

Yunnan: above Tapintze, Chouang-che-teou, Delavay, 3308.

5. **Indigofera scabrida,** Dunn in Journ. Linn. Soc. xxxv, 487 (1903).

Yunnan: eastern flank of the Lichiang Range, 3000–3300 m., Forrest, 6314; Mengtze, 1380–1800 m., Henry, 9686*a*, 9686*b*; Yunnanfu, Ducloux, 533; near Yunnansen, Maire, 2223, 2313, 2354.

West China: Wilson, 3385.

6. **Indigofera caudata,** Dunn in Gard. Chron. xxxii, 210 (1902).

Yunnan: Szemao forests, 1350–1500 m., Henry, 12166, 12166*a*, 12166*b*.

Cult. Hort. Kew.

7. **Indigofera hirsuta,** Linn. Sp. Pl. 751 (1753); Bentham Fl. Hongk. 76 (1861); Baker in Hook. fil. Fl. Brit. Ind. ii. 98 (1876); Forbes et Hemsl. in Journ. Linn. Soc. xxiii, 157 (1886); Dunn et Tutcher Fl. Kwangtung in Kew Bull. Add. Ser. x, 75 (1912).

Kwangtung: Pakhoi, Playfair, 80; Macao, Vachell, 227, Callery, 126, Nelson; Hongkong, Hinds, Wilford, 167, Wright, 117, Lamont in Herb. Hance, 576; Swatow, Dalziel.

Chekiang: Chusan, W. Brown, 63.

China, without definite locality, Macartney and Staunton.

8. **Indigofera stachyodes,** Lindl. Bot. Reg. t. 14 (1843).

I. Dosua, Ham., var. *tomentosa*, Baker in Hook. fil. Fl. Brit. Ind. ii, 102 (1876).

Yunnan: Szemao hills, 1500 m., Henry, 12276; Salween valley, lat. 25° 5′ N., 900 m., Forrest, 5503.

9. **Indigofera Parkesii,** Craib.

I. venulosa, Forbes et Hemsl. in Journ. Linn. Soc. xxiii, 158 (1886) in part *vix* Champion.

China: without definite locality, Parkes.

10. **Indigofera Pampaniniana,** Craib.

Yunnan: around Yunnansen, Maire, 818, 1602, 2427.

Probably identical with *I. Mairei*, var. *proterantha*, Pampanini.

11. **Indigofera Duclouxii,** Craib.

Yunnan: Yunnanfu, Ducloux, 706.

12. **Indigofera argutidens,** Craib, nom. nov.

I. leptosepala, Diels in Notes, Roy. Bot. Gard., Edin., No. xxv, 245 (1912) et xxxii, 150 (1912) *non* Nuttall (1838).

Yunnan: eastern flank of the Lichiang Range, 3000–3330 m., Forrest, 2651.

13. **Indigofera Dielsiana,** Craib.

I. pendula, Franchet, var., Diels in Notes, Roy. Bot. Gard., Edin., No. xxxiii, 219, 220 (1912).

Yunnan: eastern flank of the Tali Range, 2100–2700 m., Forrest, 4251, 4258; Yunnanfu, Ducloux, 817.

14. **Indigofera Balfouriana,** Craib.

Yunnan: eastern flank of the Lichiang Range, 2700–3000 m., Forrest, 5627.

15. **Indigofera Fortunei,** Craib.

I. venulosa, Forbes et Hemsl. in Journ. Linn. Soc. xxiii, 158 (1886) *vix* Champion.

China: Fortune, 43 ex. Herb. Benth., Fortune, sine num. ex Herb. Hook.

Kiangsi: Kiukiang, Maries; La Schan Mts., Maries, 227.

Kiangsu: near Shanghai, Fengwanshan, Herb. Forbes; Chinkiang, Carles, T. L. Bulloch.

? Cult. Hort. Kew ex Hongkong.

16. **Indigofera Cooperii,** Craib.

I. macrostachya, Forbes et Hemsl. in Journ. Linn. Soc. xxiii, 157 (1886) in part, *vix* Vent.

Chekiang: Ningpo district, Cooper, May 1884.

17. **Indigofera Myosurus,** Craib.

West China, 900 m., Wilson, 3382.

18. **Indigofera elliptica,** Roxb. Hort. Beng. 57 (1814)—nomen tantum—et Fl. Ind. iii, 380 (1832), *nec* E. Mey. (1835).

I. pulchella, Baker in Hook. fil. Fl. Brit. Ind. ii, 101 (1876) in part.

Yunnan: Red River, Manpan, Henry, 10980; Szemao forests, 1200 m., Henry, 12781; ? Yunnansen, Maire, 1397; Bourne, 29.

19. **Indigofera Kirilowii,** Maxim. ex Palibin in Act. Hort. Petrop. xvii, 62, t. 4 (1899), in part.

I. macrostachya, Bunge Enum. Pl. China bor. 16 (1834); Franchet Pl. David. 82 (1884); Forbes et Hemsl. in Journ. Linn. Soc. xxiii, 157 (1886) in part, *vix* Vent.

North China: Bunge, Bretschneider, 187, Tatarinow, Daniell, Mrs. B. Stuart.

Chihli: Pekin, Carles, Bushell.

Shinking: Talienwan, Williams in Herb. Hance, 6547, Swinhoe, Urquhart, 13, Birnie; Chienshan, Ross, 506.

Corea: Seoul, Sontag; Chemulpo, Jack.

Shantung: Williamson, Couling; Chefoo, Perry, Hancock, 21, Carmichael in Herb. Forbes, 111.

I. Kirilowii, Maxim. ex Palibin, forma **coreana,** Craib.

I. macrostachya, Forbes et Hemsl. in Journ, Linn. Soc. xxiii, 157 (1886) in part, *vix* Vent.

Corea: Chemulpo, Carles, 173; West Coast, lat. 39° N. Perry, 22.

I. Kirilowii, if all the plants cited above really belong, is somewhat variable, and probably the form described as *coreana* should not then be kept apart, although the calyx is rather larger and the racemes are much longer in proportion to the leaves than usual. The Chefoo plant is also somewhat distinct in the fewer and more rigid hairs on the leaflets. Allied to this species, and probably identical with it, is the plant (Purdom, 123) recently introduced by Messrs. Veitch from Shensi, Wutai Shan.

20. **Indigofera rigioclada,** Craib.

I. chaetodonta, Franchet, var., Diels in Notes, Roy. Bot. Gard., Edin., No. xxxii, 97 (1912).

I. Gerardiana, Diels in Notes, Roy. Bot. Gard., Edin., xxxii, 218 (1912), *non* Wall.

Yunnan: eastern flank of the Lichiang Range, 2700–3300 m., Forrest, 2099, 5633; eastern flank of the Tali Range, 2400–2700 m., Forrest, 4235.

21. **Indigofera Monbeigii,** Craib.

S.W. China, Monbeig; N.W. Yunnan, Monbeig, 67.

W. Szechuan, Wilson, 3075, 3080 (May 1908).

22. **Indigofera Wilsonii,** Craib.

W. Szechuan, Wilson, 3074.

23. **Indigofera ichangensis,** Craib.

Hupeh: Ichang, Henry, 3512, 3568; W. Hupeh, Wilson, 466; Central China, Fang, Wilson, 2034.

I. ichangensis, Craib, forma **leptantha,** Craib.

W. Hupeh: Wilson, 3081; Ichang, Henry, 3865.

I. ichangensis, Craib, forma **rigida,** Craib.

Hupeh, Wilson, 3083, Henry, 4259, 6280.

I. ichangensis, Craib, forma **calvescens,** Craib.

W. Hupeh, Wilson, 3082.

The writer had at first regarded the above as representing four distinct species, but on further examination he found no definite, reliable character by which to separate them, although the plants at first sight do appear distinct. The first form is characterised by the rather long racemes of narrow flowers, the second by the rather rigid leaves, and the third by the very scattered hairs (probably at length deciduous) on the under surface of the leaflets.

24. **Indigofera Carlesii,** Craib.

Kiangsu: Chinkiang, Carles.

25. **Indigofera chalara,** Craib.

Central China: Hsing Shan cliffs, Wilson, 1230 (coll. May 1901); West Hupeh, Wilson, 1230 (coll. June 1900).

26. **Indigofera dichroa,** Craib.

W. Szechuan, Wilson, 3084.

27. **Indigofera venulosa,** Champion ex Bentham in Hook. Kew Journ. Bot. iv, 44 (1852); Bentham Fl. Hongk. 77 (1861); Forbes et Hemsl. in Journ. Linn. Soc. xxiii, 158 (1886) in part; Dunn et Tutcher Fl. Kwangtung in Kew Bull. Add. Ser. x, 75 (1912).

Kwangtung: Hongkong, Champion, Champion, 255, Wright, 118, Herb. Hance, 1166; top of hill above 200 yds. rifle range, Urquhart; Mount Victoria, Lamont.

28. **Indigofera Faberii,** Craib.

I. venulosa, Forbes et Hemsl. in Journ. Linn. Soc. xxiii, 158 (1886) in part, vix Champ.

Chekiang, Tien Tai Mts., 300 m., Faber, 243.

29. **Indigofera pendula,** Franchet Pl. Delavay, 156 t. 37 (1889).

Yunnan: near Langkong, Yang-in-chan, 2500 m., Delavay, 1980; Hee-chan-men, Delavay; side valleys of eastern flank of Lichiang Range, 2550–3150 m., Forrest, 5562; eastern flank of Lichiang Range, 2700-3000 m., Forrest, 2197.

30. **Indigofera decora,** Lindl. in Journ. Hort. Soc. i, 68 (1846) et Bot. Reg. t. 22 (1846); Bentham Fl. Hongk. 77 (1861); Forbes et Hemsl. in Journ. Linn. Soc. xxiii, 156 (1886); Dunn et Tutcher Fl. Kwangtung in Kew Bull. Add. Ser. x, 75 (1912).

China, Fortune, *a*60.
Anwhei: Wuhu, Carles.
Cult. Hort. Soc. Lond., Kew, Chelsea, Vilmorin.
Hongkong, East Point, Eyre icon ined. in Herb. Kew.

31. **Indigofera Delavayi,** Franchet Pl. Delavay, 154 (1889).

Yunnan: Tapintze, near Tali, Delavay, 512; near Tapintze, Delavay, coll. 28th September 1888.

32. **Indigofera hendecaphylla,** Jacq. Ic. Pl. Rar. 14 t. 570 (1786–93); Bentham Fl. Hongk. 76 (1861); Baker in Hook. fil. Fl. Brit. Ind. ii, 98 (1876); Forbes et Hemsl. in Journ. Linn. Soc. xxiii, 156 (1886); Dunn et Tutcher Fl. Kwangtung in Kew Bull. Add. Ser. x, 75 (1912).

Yunnan: Szemao, 1350 m., Henry, 12308, 12495; gorge between the Tengchuan and Langkong valleys, 2100 m., Forrest, 5587.
Hongkong, Wright, 477.

33. **Indigofera subnuda,** Craib.

Kiangsu: Hills near Shanghai, Carles; Hoochow, Carles, 57.
Chekiang: Carles et Forbes, coll. 17th April 1881.

34. **Indigofera chaetodonta,** Franchet Pl. Delavay, 155 (1889).

Yunnan: near Langkong, Hee-chan-men, 3000 m., Delavay, 2848; along the base of the eastern flank of the Lichiang Range, 2700 m., Forrest, 6032.

35. **Indigofera Silvestrii,** Pampanini in Nuov. Giorn. Bot. Ital. xvii, 397 (1910).

Hupeh: Siang-yang, 100 m., Silvestri, 1091.

36. **Indigofera sensitiva,** Franchet Pl. Delavay, 157 (1889).

Yunnan: Ki-mi-se, Kiang-yn, 2000 m., Delavay, 3022; near Tapintze, Delavay; beneath Pien-kio, Delavay; south end of Hoching valley, 2400 m., Forrest, 7353; gorge between the Tengchuan and Langkong valleys, 2100 m., Forrest, 5588.

37. **Indigofera mengtzeana,** Craib.

Yunnan: Mengtze woods 1650 m., Henry, 10627; near Yunnansen, Maire, 1978.

38. **Indigofera Pseudotinctoria,** Matsumura in Bot. Mag. Tokyo xvi, 62 (1902).

I. tinctoria, Forbes et Hemsl. in Journ. Linn. Soc. xxiii, 157 (1886) in part *vix* Linn.

I. Bungeana, Forbes et Hemsl. in Journ. Linn. Soc. xxiii, 156 (1886) in part *vix* Walp.

China, without definite locality, Fortune, *a*56.

Yunnan: Monbeig, Monbeig, 68; Mengtze plain, Hancock, 333; Mengtze, 1380 m., Henry, 10387*a*; near Yunnansen, Maire, 500, 1619.

Szechuan, Mesny.

Hupeh: Henry, 36, 1926, 6062, Wilson, 408, 2711, 786, 3489, 3490, 3076 (the last four in 1907 expedition).

Kwangtung: Ford, 56.

Kiangsi: Kiukiang, Herb. Forbes, 93, 121.

Kiangsu: Chinkiang, Bulloch.

39. **Indigofera Anil,** Linn. Mant. 272 (1771); Bentham Fl. Hongk. 77 (1861); Forbes et Hemsl. in Journ. Linn. Soc. xxiii, 155 (1886); Dunn et Tutcher Fl. Kwangtung in Kew Bull. Add. Ser. x, 75 (1912).

Kwangsi: Lungchow, Morse, 269.

Kwangtung: Pakhoi, Playfair, 11; Hongkong, Seeman, 2486, Herb. Hance, 575.

40. **Indigofera Bungeana,** Walp. in Linnaea xiii, 525 (1839); Franchet Pl. David. i, 82 (1884); Forbes et Hemsl. in Journ. Linn. Soc. xxiii, 156 (1886) in part.

I. micrantha, Bunge Enum. Pl. China bor. 16 (1834) *non* Desv. *nec* E. Mey.

North China: Bunge, Bretschneider, Potanin; Pekin, foot of Mount Conolly, Carles; Pekin, Williams.

This species, so far as the writer has seen, is confined to North China. The specimen recorded by Diels (Engler Jahrb. xxix, 411) from Ichang may be *I. Pseudotinctoria.*

41. **Indigofera Hosiei,** Craib.

Kansu or Shensi, Hosie, 1 (1910).

42. **Indigofera lenticellata,** Craib.

West China: Min valley, 1350 m., Wilson, 3386.

43. **Indigofera sticta,** Craib.

Yunnan: Mengtze, 1800 m., Henry, 13720.

44. **Indigofera reticulata,** Franchet Pl. Delavay, 153 (1889).

I. chaetodonta, Diels in Notes, Roy. Bot. Gard., Edin., No. xxxiii, 218 (1912) *non* Franchet.

Yunnan: Hoang-li-pin, above Tapintze, 2000 m., Delavay, 1964; eastern flank of Tali Range, 2400 m., Forrest, 4234; S.W. Yunnan, Monbeig.

45. **Indigofera szechuensis,** Craib.

W. Szechuan, Wilson, 3075*a*.

46. **Indigofera Potaninii,** Craib.

West Kansu, Potanin anno 1885.

47. **Indigofera Souliei,** Craib.

Tatsienlu, Soulie, 870, Pratt, 285, 729.

48. **Indigofera amblyantha,** Craib.

West Hupeh, Wilson 3077 (type), 3078, 3087*a*, 3079 (all coll. 1907), 2017 (Veitch expedition).

It is probable that more than one species is represented by the collections quoted, *e.g.* 3078*a* and 3079 have larger flowers than in the type, the former reaching nearly 8 mm. and the latter 7 mm., but with the present available material the writer is disposed to regard them all as forms of one species.

49. **Indigofera Mairei,** Pampanini in Nuov. Giorn. Bot. Ital. xvii, 16 (1910).

Yunnan, Maire, 146; near Yunnansen, Maire, 144, 220, 1803, 1850.

Allied to *I. Mairei* is Wilson, 3384 (May 1904) from Tung valley.

50. **Indigofera Henryi,** Craib.

Yunnan: Mengtze, rocky mountains, 1650–1950 m., Henry, 10050*a*, 10050*b*; near Yunnansen, Maire, 3, 494, 495, 521, 2016, 2626.

Probably some of the plants collected by Maire may eventually prove distinct.

I. Henryi, Craib, var. **silvarum,** Craib.

Yunnan: Mengtze, wooded glens, 1500–1800 m., Hancock, 368.

51. **Indigofera cinerascens,** Franchet Pl. Delavay, 153 (1889).

Yunnan: Tapintze, Delavay, 519; Long-teon-chan, anno 1888, Delavay.

52. **Indigofera Hancockii,** Craib.

Yunnan: Mengtze mountains, 1500–1950 m., Hancock, 332, ? Henry, 13719.

53. **Indigofera Forrestii,** Craib.

Yunnan: eastern flank of the Tali Range, 2400–2700 m., lat. 25° 40′ N., Forrest, 7000.

54. **Indigofera nigrescens,** Kurz ex King et Prain in Journ. As. Soc. Beng. lxvii, 286 (1898).

Yunnan: Mengtze woods, 1650 m., Henry, 11212; Szemao, grass mountains, 1800 m., Henry 13716.

55. **Indigofera galegoides,** DC. Prodr. ii, 225 (1825); Baker in Hook. fil. Fl. Brit. Ind. ii, 100 (1876).

China, Morse, 269.

56. **Indigofera Teysmannii,** Miq. Fl. Ind. Bat. i, 1, 1083 (1855).

I. Benthamiana, Hance in Ann. Sc. Nat. 4^e ser. xviii, 219 (1862); Forbes et Hemsl. in Journ. Linn. Soc. xxiii, 156 (1886).

Kwangtung: Whampoa, Herb. Hance, 6063.

57. **Indigofera atropurpurea,** Ham. ex Roxb. Hort. Beng. 57 (1814)—nomen tantum—et Fl. Ind. iii, 381 (1832); Baker in Hook. fil. Fl. Brit. Ind. ii, 101 (1876) in part; Forbes et Hemsl. in Journ. Linn. Soc. xxiii, 156 (1886) in part; Dunn et Tutcher Fl. Kwangtung in Kew Bull. Add. Ser. x, 75 (1912) in part.

Kwangtung: Staunton; Shiu Hing Pass, Ford.

Yunnan: Mengtze, 1380–1500 m., Henry, 9720, 9720*a*?

The Yunnan plant is provisionally referred to this species, which is rather imperfectly known, but so far as the writer is aware the Kwangtung plant is probably the true plant of Hamilton. The Fukwing plant, collected by Krone and named *I. atropurpurea* by Hance, does not belong to the genus.

Species Excludendae.

Indigofera chinensis, Vogel in Nov. Act. Nat. Cur. xix, Suppl. i, p. 14.

Indigofera rotundifolia, Lour. Fl. Cochin. 458.

From the descriptions of these two species it is highly probable that they do not belong to the genus.

Indigofera melilotoides, Hance in Journ. Bot. 163 (1869) = *Astragalus.*

Species Incertae Sedis.

Indigofera alba, Goualt in Rev. Hortic. Ser. iv, iii, p. 361 t. 19.

Indigofera macrostachya, Vent. Jard. Malm. p. et t. 44.

Indigofera virgata, *β* **parvifolia,** DC. Prodr. ii, 224.

Indigofera subulata, Diels in Engler Jahrb. xxix, 411 *an* Vahl ?

Indigofera tinctoria, auct. var. probabiliter = *I. Pseudotinctoria.*

Indigofera trita, Loureiro *an* Linn. f. ?

Indigofera heterantha, Franchet Pl. Delavay, 154 *an* Wall ?

III. ARTIFICIAL KEY TO CHINESE SPECIES OF INDIGOFERA.

The numbers in heavy type refer to the preceding enumeration.

1.	Leaves simple	**1.** I. linifolia.
	Leaves compound	2.
2.	Leaflets 3	3.
	Leaflets more than 3	6.
3.	Racemes sessile, leaflets glandular, with few adpressed hairs	**2.** I. trifoliata.
	Racemes peduncled, leaflets not glandular	4.
4.	Leaflets rufo-villous	**3.** I. sericophylla.
	Leaflets (rarely so few as three) with scattered adpressed hairs	5.
5.	Leaflets reticulate	**27.** I. venulosa.
	Leaflets not reticulate	**43.** I. sticta.
6.	Stem (or branchlets) at least in young stage with spreading or subadpressed hairs	7.
	Stem (or branchlets) in young stage glabrous or with closely adpressed hairs	17.

7. Gland-tipped hairs present . . . . . 8.
Gland-tipped hairs absent . . . . . 9.

8. Leaflets 11–13, not glandular ciliate, calyx lobes more than twice the tube not glandular, bracts plumose . . 4. I. dolichochaete.
Leaflets 7–9, rarely 11, glandular ciliate, calyx lobes rather less than twice the tube, glandular, bracts glandular . . 5. I. scabrida.

9. Leaflets glabrous on the upper surface, up to 9 cm. long . . . . 6. I. caudata.
Leaflets pubescent on both surfaces, up to 4 cm. long (generally much shorter) . . . 10.

10. Corolla only slightly exceeding the calyx . 7. I. hirsuta.
Corolla long exserted . . . . . 11.

11. Leaflets over 10 pair, racemes dense, longer than the leaves, bracts conspicuous . 8. I. stachyodes.
Leaflets under 10 pair . . . . . 12.

12. Corolla at least 1 cm. long, young stem (or branches) rather densely spreading pubescent . . . . 13.
Corolla not over 1 cm. long, young stem (or branches) with few subspreading hairs . . . 16.

13. Calyx lobes not exceeding 1.5 mm. . . 9. I. Parkesii.
Calyx lobes exceeding 2 mm.. . . . . 14.

14. Petiole less than 1 cm. long, stipules 5 mm. long, calyx lobes 4–4.5 mm. long . . 12. I. argutidens.
Petiole over 2 cm. long, stipules at least 7 mm. long, calyx lobes up to 3 mm. long . . . 15.

15. Corolla 13 mm. long . . . 10. I. Pampaniniana.
Corolla 17 mm. long . . . . 11. I. Duclouxii.

16. Calyx tube 2 mm. long, lowest lobe 1.5 mm. long . . . . . . 13. I. Dielsiana.
Calyx tube 1 mm. long, lowest lobe 1.25 mm. long . . . . 14. I. Balfouriana.

17. Corolla at least 1 cm. long . . . . . 18.
Corolla less than 1 cm. long . . . . . 41.

18. Leaflets glabrous or in young stage with a few hairs on margin and costa . . 15. I. Fortunei.
Leaflets pubescent . . . . . . 19.

19. Medifixed hairs on both surfaces of leaflets . . . 20.
Medifixed hairs only on lower surface of leaflets . . . . 34.

20. Leaflets at least 7 pair . . . . . 21.
Leaflets fewer than 7 pair . . . . . 23.

21. Peduncle decidedly shorter than petiole, corolla glabrous in bud except margin of vexillum . . . . **18.** I. elliptica.
Peduncle subequal to or longer than petiole, corolla in bud pubescent all over . . . 22.

22. Pedicels, rachis of leaf and of raceme glabrous, calyx lobes less than 1.5 mm. long . **16.** I. Cooperii.
Pedicels, rachis of leaf and of raceme brown pubescent, calyx lobes up to 2.5 mm. long **17.** I. Myosurus.

23. Leaflets 5 . . . . . **26.** I. dichroa.
Leaflets more than 5 (5–foliolate leaves may occasionally occur) . . . . . 24.

24. Leaflets mostly opposite (lower 1–2 pair occasionally alternate) . . . . . 25.
Leaflets alternate or subalternate . . . . 33.

25. Corolla in bud glabrous except at apex and margin of vexillum . . . . . . 26.
Corolla in bud pubescent all over . . . . 28.

26. Peduncle shorter than petiole . . **18.** I. elliptica.
Peduncle longer than petiole . . . . 27.

27. Calyx 3 mm. long, racemes subequal to leaves. **19.** I. Kirilowii.
Calyx 4 mm. long, racemes much longer than leaves . . **19.** I. Kirilowii, var. coreana.

28. Leaflets not exceeding 2 cm. long and 1 cm. broad . . . . 29.
Leaflets over 2 cm. long and 1 cm. broad . . . 32.

29. Corolla 1.5 cm. long, bracts longer than pedicel, long persistent . . . **22.** I. Wilsonii.
Corolla less than 1.2 cm. long, bracts small, deciduous . . . . . . 30.

30. Stipules 1 mm. long . . . . **20.** I. rigioclada.
Stipules at least 3 mm. long . . . . . 31.

31. Pedicels 2 mm. long, racemes 3.5 cm. long . **21.** I. Monbeigii.
Pedicels 6 mm. long, racemes 8 cm. long . **17.** I. Myosurus.

32. Leaflets 5–9, young branches and leaf rachis adpressed pubescent . . . **24.** I. Carlesii.
Leaflets 9–13, young branches and leaf rachis glabrous . . . . **23.** I. ichangensis.

33. Leaflets 7–9, 17–30 mm. long . . **25.** I chalara.
Leaflets 13–17, 7–19 mm. long . . **16.** I. Cooperii.

34. Leaflets prominently reticulate on both surfaces, ovate to orbicular or terminal subrhomboid . . . . **27.** I. venulosa.
Leaflets not prominently reticulate . . . . 35.

35. Keel not acuminate . . . . **31.** I. Delavayi.
Keel acuminate . . . . . . 36.

36. Acumen of keel nearly 2 mm. long . . **28.** I. Faberii.
Acumen of keel short—not more than 0.5 mm. long . . . . 37.

37. Leaflets rounded or retuse at apex, racemes long, pendulous . . . . **29.** I. pendula.
Leaflets narrowing upwards from about the middle rarely rounded, racemes erect or suberect . . . . . . 38.

38. Petiole and leaf rachis channelled above . **30.** I. decora.
Petiole and leaf rachis (except towards insertion of upper leaflets) terete . . . . 39.

39. Wings decidedly less than keel, corolla to 12 mm. long . . **23.** I. ichangensis f. leptantha.
Wings subequal to or longer than keel, corolla at least 13 mm. long . . . . . 40.

40. Wings subequal to keel, corolla nearly 16 mm. long . . . **23.** I. ichangensis, f. rigida.
Wings slightly longer than keel, corolla to 13.5 mm. long . . **23.** I. ichangensis, f. calvescens.

41. Leaflets all distinctly alternate, generally 11 . **32.** I. hendecaphylla.
Leaflets opposite or occasionally the lower alternate . . . . . . 42.

42. Leaflets glabrous or in young stage with a few hairs on margin and costa . . **33.** I. subnuda.
Mature leaflets not glabrous . . . . . 43.

43. Leaflets glabrous on upper surface except occasionally along the margin . . . . 44.
Leaflets glabrous on neither surface . . . . 49.

44. Virgate plant reaching only 15 cm. in height, leaflets scarcely 5 mm. long . . **34.** I. chaetodonta.
Plants at least 30 cm. high . . . . . 45.

45. Leaves not exceeding 1.5 cm. in length . **35.** I. Silvestrii.
Leaves at least 3 cm. long . . . . . 46.

46. Legumes curved . . . . . **39.** I. Anil.
Legumes straight . . . . . . 47.

47. Buds acute or acuminate . . . **36.** I. sensitiva.
Buds obtuse . . . . . . 48.

48. Racemes much less than the 13–17-foliolate leaves, petiole over 15 mm. long . **37.** I. mengtzeana.
Racemes subequal to or longer than the 7–15-foliolate leaves, petiole less than 15 mm. long . . . . **38.** I. Pseudotinctoria.

49. Corolla not exceeding 5 mm. in length . . . . 50.
Corolla at least 5 mm. long . . . . . . 51.

50. Legumes curved . . . . . **39.** I. Anil.
Legumes straight . . . . **40.** I. Bungeana.

51. Leaflets 11 or fewer . . . . . . 52.
Leaflets more than 11 (occasional leaves with 11 leaflets may occur) . . . . . 61.

52. Peduncle subequal to or longer than petiole . . . 53.
Peduncle distinctly shorter than petiole . . . 59.

53. Corolla less than 7 mm. long, leaflets up to 1 cm. long . . . . . . 54.
Corolla at least 7 mm. long, leaflets up to 2.5 cm. long . . . . . . 55.

54. Calyx lobes up to 2 mm. long . . **41.** I. Hosiei.
Calyx lobes up to 1 mm. long . . **42.** I lenticellata.

55. Leaflets 3–5, racemes subequal to leaves . **43.** I. sticta.
Leaflets 7–11 . . . . . . 56.

56. Pedicels (in flowering stage) at least 3 mm. long . . . . . **47.** I. Souliei.
Pedicels (even in fruit) not exceeding 3 mm. in length . . . . . . 57.

57. Stipules 7–8 mm. long, stipellae conspicuous, leaflets reticulate . . . **44.** I. reticulata.
Stipules less than 4 mm. long, stipellae small, leaflets not reticulate . . . . . 58.

58. Corolla to 9.5 mm. long, stipules 2 mm. long . **45.** I. szechuensis.
Corolla to 7 mm. long, stipules nearly 4 mm. long . . . . . **46.** I. Potaninii.

59. Buds acute or acuminate . . . **49.** I. Mairei.
Buds rounded at apex . . . . . 60.

60. Petiole at least 30 mm. long, flowering pedicel 1.5 mm. long . . . . **48.** I. amblyantha.
Petiole less than 15 mm. long, flowering pedicel 1 mm. long . . . **38.** I. Pseudotinctoria.

61. Pedicels at least 3 mm. long . . . . . 62.
Pedicels less than 3 mm. long . . . . 63.

62. Racemes shorter than or subequal to the leaves . . . . . **50.** I. Henryi.
Racemes longer than the leaves . . **47.** I. Souliei.

63. Corolla glabrous or nearly so in bud . . **57.** I. atropurpurea
Corolla adpressed pubescent in bud . . . . 64.

64. Leaflets more or less lanceolate, narrowing gradually upwards from about middle, 4–6 cm. long . . . . **56.** I. Teysmannii.
Leaflets more or less oblong, not exceeding 3.5 cm. in length . . . . . 65.

65. Leaflets 12–35 mm. long, bracts conspicuous or subconspicuous . . . . . 66.
Leaflets not exceeding 12 mm. in length, bracts not conspicuous 67

66. Corolla about 6 mm. long, bracts conspicuous, leaflets up to 22 mm. long . . **54.** I. nigrescens.
Corolla about 8 mm. long, bracts subconspicuous, leaflets up to 35 mm. long . **55.** I. galegoides.

67. Keel long acuminate . . . **51.** I. cinerascens.
Keel shortly or scarcely acuminate . . . . 68.

68. Leaflets 9–17, corolla 7.25 mm. long . . **52.** I. Hancockii.
Leaflets up to 13, corolla 6.5 mm. long . **53.** I. Forrestii.

A New Disease on the Larch in Scotland.

BY

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With Plate XIII.

On the 22nd May 1912, Mr. Donald Grant, forester to Sir John Stirling Maxwell on his estate of Fersit in Inverness-shire, sent to one of us specimens of *Larix europaea* with a fungus disease on the leaves, which, he remarked, bore a striking resemblance to the pine leaf rust, *Peridermium pini f. acicola.*

An examination of the specimens in the laboratory leads to the conclusion that fungus present must be provisionally included in *Peridermium*, a genus of the Uredineae, consisting of a number of species parasitic on Gymnosperms, of which only the aecidial stage is known. Klebahn,* in 1898, described a species of this genus parasitic on the larch, which he named *Aecidium* (*Peridermium*) *Laricis*,† and, although the form under discussion does not agree in all respects with Klebahn's description, the differences are too slight to justify the creation of a new species. In the same paper Klebahn shows that *Aecidium* (*Peridermium*) *Laricis* is the aecidial stage of *Melampsoridium betulinum.*

As the occurrence of *Peridermium Laricis* has not been previously recorded in Scotland, the following information may prove of value to those interested in forestry. In his observations of the appearance of the fungus, Mr. Grant found that the larch was attacked early in the season, and that the fungus was fully developed on leaves when they were about three weeks old. It is interesting to note that, in his subsequent observations, he found the branches had shed their diseased leaves by 30th July, and, in consequence, no further material was available for examination. This would indicate that the stage of the fungus upon the larch runs a rapid course, and may thus account to some extent for the fact that it has previously escaped observation.*

---

* Kulturversuche mit heteröcischen Rostpilzen. Bericht vii (1898). Zeitschr. f. Pflanzenkr., Bd. ix, 1899, p. 14.

† Arthur and Kern, in Bull. Torr. Bot. Club, vol. xxxiii, 1906, p. 403, definitely placed this species in the genus *Peridermium*; the fungus is therefore described as *Peridermium Laricis* (Kleb.), Arth. et Kern, by Saccardo in the Sylloge Fungorum, vol. xxi, 1912.

The fungus is almost always found on the under surface of the leaves, but occasionally on the upper side. The aecidia are arranged in rows on one or both sides of the midrib, and are separated by short, irregular intervals (Figs. 1, 2, and 3, Pl. xiii). The number of aecidia on each leaf is variable, but usually 6–15. Each group of spores is enclosed by a delicate white protective covering, the pseudoperidium, which, at maturity, has the form of a cylinder, slightly flattened laterally and open at the upper end. The pseudoperidium varies from ·5–·7 mm. in height, ·5–·7 mm. long, and ·3–·4 mm. wide. In the earlier stages it is closed, and then the cylindrical part is terminated by a bluntly conical upper portion (long pointer, Fig. 1). The ripe aecidiospores are set free by the irregular rupture of the apex of the pseudoperidium, and, in consequence, after dehiscence has taken place, this is terminated by a ragged or lacerate margin (see short pointer, Fig. 1 and Fig. 4). Occasionally two adjacent pseudoperidia become partially or completely fused together (Fig. 2). The wall of the pseudoperidium is one cell in thickness, the cells being rhomboidal or polygonal in shape and the walls finely verrucose (Fig. 6). The numerous spores are orange-yellow in colour and rather irregular in shape, ellipsoidal or polyhedral, about 16–22 μ in length and 14–18 μ broad. The spore wall is evenly verrucose except a small area, which is smooth, and thinner than the remaining portions. Fig. 4 represents a spore in optical median section and Fig. 5 in surface view. It will be seen that the outer part of the wall consists of a number of rods of material placed perpendicularly to the surface (Fig. 4). Before dehiscence takes place the spores are found arranged in chains at the base of the pseudoperidium; when the latter ruptures they easily separate and escape from the opening at the upper end.

A fungus known as *Caeoma Laricis* bears a considerable resemblance to the form just described on the larch. *Caeoma*

---

* A re-examination of diseased larch leaves, sent by Mr. Murray, forester at Murthly, Perthshire, in June 1911, shows that the fungus present is an early condition of *Peridermium Laricis*.

Laricis produces orange-yellow spots on the leaves, but is at once distinguished from *Peridermium Laricis* by the entire absence of the pseudoperidium, as well as by differences in the sculpturing of the spore wall. *Caeoma Laricis* has been shown by Klebahn and others to be the aecidial stage of six different species of *Melampsora*, in which the uredospore and teleutospore stages occur on various species of *Populus* and *Salix*.

Although no definite record of the occurrence of *Peridermium Laricis* in Great Britain or Ireland has been made it is probable that Plowright,* in 1891, carried out experiments with this species. This investigator discovered a form of *Caeoma Laricis* near King's Lynn, the aecidiospores of which, when placed on *Betula alba*, caused infection, and, in course of time, the uredospore and teleutospore stages of *Melampsora betulina* were produced. A subsequent infection of *Larix europaea* by the germinating teleutospores produced spermogonia only.

Klebahn,† by infection experiments commenced in 1896 in the neighbourhood of Hamburg, conclusively proved that *Peridermium Laricis* is the aecidial condition of *Melampsora betulina*. In his earlier experiments spermogonia were formed on *Larix europaea* as the result of infection by teleutospores from the birch, but, in later investigations, aecidia only were produced.

Melampsora betulina differs from the remaining species of the genus in the presence of a pseudoperidium enclosing the uredospore sorus. Klebahn † has therefore instituted a new genus *Melampsoridium* for the reception of this species. The differences between the two genera are as follows :—

Melampsoridium: Aecidium of the *Peridermium* type. Uredospore sorus with a definite pseudoperidium.

Melampsora: Aecidium of the *Caeoma* type. Uredospore sorus surrounded by capitate hairs but without a definite pseudoperidium.

The teleutospore sorus is similar in each genus.

Arthur and Kern ‡ include *Peridermium Laricis* in their list of North American species since *Melampsoridium betulinum* is of common occurrence in that country ; the stage on the larch has not yet, however, been found in North America. Saccardo § records its occurrence in France and Germany.

The specimens of *Peridermium Laricis* obtained in Scotland differ in some respects from those described by Klebahn. Up to the present no spermogonia have been discovered ; it is possible, however, that these develop earlier than the aecidia, and have, in consequence, been overlooked. The colour of the pseudoperidium is described by Klebahn as bright red-orange (" hell rötlich-orange "). In the Scottish specimens, in the early stages before the pseudoperidium had opened, the colour was pale yellow, and, after dehiscence, it became white.

---

* Einige Impfversuche mit Rostpilzen. Zeitschr. f. Pflanzenkr., Bd. i, 1891, p. 130.

† *Loc. cit.* and Kulturversuche mit Rostpilzen. Bericht viii (1899). Jahrb. f. Wiss. Bot., Bd. xxxiv, 1900, p. 347.

‡ *Loc. cit.*

§ Sylloge Fungorum, vol. xxi.

Considering the abundance of *Melampsoridium betulinum* in this country, it is a remarkable fact that *Peridermium Laricis* is of such rare occurrence. Its resemblance to *Caeoma Laricis* may, however, partly explain the absence of previous records. It is possible that *Melampsoridium betulinum* really consists of several physiological species, and that *Peridermium Laricis* is only one of its aecidial forms; this supposition may explain the absence of records from North America. At present no information is available on this point, but it is proposed to carry out infection experiments to throw light on this and other questions in connection with the life history of the fungus.

DESCRIPTION OF PLATE XIII.

All figures refer to *Peridermium Laricis*.

FIG. 1.—Photograph of twig of *Larix europaea* showing diseased leaves: (*a*) pseudoperidium showing lacerate margin (short pointer); (*b*) unopened pseudo-peridium (long pointer) (× 4).

FIG. 2.—Photograph of twig of *Larix europaea* showing diseased leaves: (*a*) fused pseudoperidia (× 4).

FIG. 3.—Photograph of twigs of *Larix europaea* showing diseased leaves (about natural size).

FIG. 4.—A pseudoperidium showing lacerate margin (× about 50).

FIG. 5.—Spore in surface view (× 1000).

FIG. 6.—Spore in optical median section (× 1000).

FIG. 7.—Part of pseudoperidium; the lower cells show the verrucose marking on the walls (× 220).

PERIDERMIUM LARICIS. ARTH. ET KERN.

Vol. VIII. Number XXXVII.

NOTES

FROM THE

ROYAL BOTANIC GARDEN, EDINBURGH.

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CONTENTS.

	Page
Notes on the Japanese Primulas. (With Plates XIV–XXV). By H. Takeda, D.I.C.	83
Cladrastis and Maackia. (With Plates XXVI–XXVII). By H. Takeda, D.I.C.	95
Diagnoses specierum novarum chinensium in herbario Horti Regii Botanici Edinburgensis cognitarum. I–L	105
Propagation of Mutisia decurrens, Cav. (With Plate XXVIII). By Laurence Baxter Stewart	137
Enumeration of Crassulaceae collected in China by Bullock, Carles, Ducloux, Forrest (second expedition), Hancock, Henry, Hosie, Hugh, Maire, Monbeig, Morse, Pratt, Wilson, with a comparative table including the species of Delavay and Forrest's first expedition. By Raymond Hamet	139
Notes on Chinese Labiatae. By Stephen Troyte Dunn, B.A., F.L.S., F.R.G.S.	153

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Notes on the Japanese Primulas.

BY

H. TAKEDA, D.I.C.

With Plates XIV–XXV.

UNLIKE her neighbouring country China, Japan possesses comparatively few species of this genus. However, more than half of the indigenous species are endemic. Since the publication of Thunberg's Flora Japonica [1] not a few botanists have directed their attention to Japanese Primulas in their floristic and systematic works.[2] In Professor Matsumura's Index Plantarum Japonicarum, vol. ii, pt. ii, published in 1912, the following 16 species are enumerated as natives of Japan :—

P. cortusoides, Linn.,
P. cuneifolia, Ledeb.,
  α. *typica*, Makino,
  β. *hakusanensis*, Makino,
  γ. *heterodonta*, Makino,
P. eximia, Greene,
P. farinosa, Linn.,
  var. *armena*, C. Koch, lusus *japonica*, Makino,
  var. *Faurieae*, Miyabe,
  var. *mistassinica*, Pax,
P. Hayaschinei, Petitm.,
P. japonica, A. Gr.,
P. jesoana, Miq.,
P. kisoana, Miq.,
P. Matsumurae, Petitm.,
P. nipponica, Yatabe,
P. nivalis, Pall.,
P. prolifera, Wall.,
P. Reinii, Fr. et Sav.,
P. sibirica, Jacq.,
P. Sieboldii, E. Morr., and
P. tosaensis, Yatabe.

---

[1] Thunb., Fl. Japon. (1784.)

[2] A. Gray, On the Botany of Japan, etc., in Mem. Am. Acad. Arts and Sc., vi (1859). Miquel, Prol. Fl. Japon. (1866–7.) Maximowicz, in Mél. Biol., vi (1867). Franchet et Savatier, Enum. Pl. Japon., i–ii (1875–9). Franchet, in Bull. de la Soc. Philom. de Paris (1886–8.) Makino, in Tôkyô Bot. Mag. (1897, 1898, 1902). Petitmengin, Les Primulacées Sino-Japonaises, in Bull. Herb. Boiss. sér. 2, vii (1907). Petitmengin, Sur une Primevère monocarpique du Japon., in Bull. Herb. Boiss. sér 2, viii (1908).

[Notes, R.B.G., Edin., No. XXXVII, Nov. 1913.]
M & G Ltd Wt 20/784 4-14 400

Lately I undertook a critical study of the Japanese Primulas in the Herbarium at Kew. During that time Professor Bayley Balfour was so kind as to give me the privilege of examining all the specimens of the Japanese Primulas preserved in the Herbarium of the Royal Botanic Garden, Edinburgh, and to give me valuable criticisms and encouragement, for which I express my sincere thanks.

As the result of my study I recognise 11 species, 3 varieties, and 2 forms as natives of Japan. Of each of them I give a short account in the following pages. As to the arrangement I generally follow Pax,[1] although I do not always agree with him.

P. SIEBOLDII, E. Morren. Plate XIV.

P. Sieboldii, E. Morren, in Belg. Hortic., xxiii (1873), forma *a.* **hortensis,** Takeda.

Syn. :—

P. Sieboldii, E. Morr., Belg. Hortic., xxiii (1873), p. 97, tab. 6.

P. Sieboldii, Pax, in Engl. Pflanzenreich, iv (1905), p. 22, *pro parte.*

P. cortusoides, var. *amoena,* Lindl., in Gard. Chron. (1862), p. 1218; Hook., in Curtis Bot. Mag. (1865), tab. 5528.

P. Sieboldii, E. Morr., forma *β.* **spontanea,** Takeda.

Syn. :—

P. Sieboldii, Pax, in Engl. Pflanzenreich, iv (1905), p. 22, *pro parte.*

P. cortusoides (non Linn.), Thunb. Fl. Japon., p. 82; Maxim., Prim. Fl. Amur., p. 192; Miq., Prol. Fl. Japon., p. 283; Fr. et Sav., Enum. Pl. Japon., i, p. 299; Petitm., in Bull. Herb. Boiss., vii (1907), p. 532.

P. patens, Turcz., in Bull. Soc. Nat. Mosc. (1838), p. 99, nom. nud.

P. cortusoides, var. *patens,* Turcz., Fl. Baic.-Dah., ii (1856), p. 224.

This species was first recorded from Japan by Thunberg, who took it for *P. cortusoides,* Linn. Many later botanists have also called it *P. cortusoides,* as the list of synonyms shows. The name *P. cortusoides* was also applied to another species, *P. saxatilis,* Kom., only recently described, although it has been cultivated in Europe over one hundred years. These three plants—*P. Sieboldii, P. cortusoides,* and *P. saxatilis*—stand in close relation, and particularly the two last mentioned are intimately allied. The only marked distinction between *P. cortusoides,* Linn., and *P. saxatilis,* Kom., is in the length of pedicels. They are as long as or a little longer than the calyx in *P. cortusoides.* They are nearly or even more than five times longer in *P. saxatilis*. This character is not always clearly shown in herbarium specimens of young stage, but seems to be well marked in cultivated individuals of *P. saxatilis*. In consequence of scarceness of trustworthy specimens of *P. cortusoides*, I have been unable to settle the question whether the pedicels of *P. cortusoides* always remain short even in the fruit-bearing stage. If this character fails to distinguish those two plants, there would exist no other point of specific distinction between them, excepting the more globose calyx-base of *P. saxatilis*. A careful comparison of living specimens is very much desired.

---

[1] Pax, in Engler's Botan. Jahrb., x (1888–9); Pax et Knuth, Primulaceae in Engler's Pflanzenreich, iv (1905).

As far as we are aware, *P. saxatilis* is distributed over Eastern Asia, with extension from the Altai through Amurland as far as Korea, whereas *P. cortusoides* is found in Western Siberia extending from the Urals to the Altai.

Turning to *P. Sieboldii*, we can easily distinguish this species from the other two by the almost glabrous and markedly accrescent calyx with patent lobes. This holds good in wild as well as in cultivated forms of this species. The patent nature of the calyx-lobes was noticed by Turczaninow as long as seventy-five years ago, when he proposed to call the plant *P. patens*. Later, when publishing its description, he unfortunately changed the name to *P. cortusoides* var. *patens*. Therefore we are unable to use the suggestive name *patens*, because in 1873 E. Morren described a garden variety of this species under the name of *P. Sieboldii*, and this name, in spite of its being somewhat unsuitable for a species occurring wild, must be adopted. Now I propose to distinguish two forms with the names *α. hortensis* and *β. spontanea*, as I have indicated above.

The garden variety bears flowers of larger size and of colours varying from pure white to deep crimson and almost purple. Some of them have the corolla inside pink or white and outside crimson or pale mauve. In some varieties the corolla tube is deep crimson. The corolla-lobes are sometimes very broad, and sometimes considerably narrowed towards the base.

The wild form also shows to some extent plasticity in colour and shape of the corolla-lobes.

The inflorescence is usually a simple umbel, but occasionally the axis grows out, producing another tier of flowers.

I may perhaps mention here that *P. cortusoides* var. *lichiangensis*, Forrest,[1] is not a variety of *P. cortusoides*, but belongs to a distinct species. It is distinguished above all by the sinuate leaf, thick lanate indumentum on the petiole and scape, and the larger bell-shaped calyx. This species, if it is different from *P. polyneura*, Franchet, should retain the name *P. lichiangensis*, Forrest.

P. Sieboldii is distributed in Japan over Yezo, Hontô, and

---

[1] G. Forrest in Notes, Roy. Bot. Gard., Edin. (1908), p. 217.

Kyûshû, growing in damp places. Its area of distribution extends also into North Eastern Asia as far as the Altai.

P. JESOANA, Miq. Plate XV.

P. jesoana, Miq., Prol. Fl. Japon., p. 283; Fr. et Sav., Enum. Pl. Japon., i, p. 299; Pax, in Engl. Pflanzenreich, iv (1905), p. 32.

This is a species with a very similar appearance to *Cortusa Mattioli*. The leaf is longly stalked with thin petiole. The lamina is orbiculate reniform in outline, cordate at the base, and shallowly 5–9-lobed with broadly ovate and sharply denticulate lobes. The inflorescence is a single umbel, but in luxuriant specimens there is a second umbel superposed. The flower is of a deep crimson colour, but not particularly attractive.

The plant is usually glabrescent, but sometimes more or less pubescent all over, and then is easily mistaken for the next species, when one runs down a key.[1] While the calyx of *P. kisoana* is invariably thickly pubescent with long soft hairs, the calyx of *P. jesoana* is never lanate-pubescent.

The systematic position of this species is undoubtedly very close to *P. septemloba*, Franch., a Yunnan species, and it belongs to the series of the Himalayan *P. geraniifolia*, Hook. f., and possibly of the Siberian *P. Kaufmanniana*, Regel.

P. jesoana is found in woods in Yezo and in the mountainous districts of Central Japan. It is also distributed in the Korean Peninsula[2] as well as the Island of Quelpart,[3] which is of great interest from the phytogeographical point of view.

P. KISOANA, Miq. Plate XVI.

P. kisoana, Miq., Prol. Fl. Japon., p. 283; Fr. et Sav., Enum. Pl. Japon., i, p. 299; Makino, in Tôkyô Bot. Mag. (1894), p. 173; Pax, in Engl. Pflanzenreich, iv (1905), p. 32.

One of the most beautiful, interesting, and rare of the Japanese Primulas. This species has a close relationship to the preceding. As characteristics this species has thick lanate indumentum, especially on the petiole, under surface of the lamina, scape, and even on the pedicel. The calyx densely hirsute is the character which distinguishes this from the foregoing species. The leaf has the lamina smaller than in the other species, with obtuse denticulation, and petiole thicker and more fleshy. This species, *P. kisoana*, Miq., is probably to be placed near *P. mollis*, Nutt., a Himalayan plant.

This species is found in S.W. Japan, but only rarely. No more specimens have been recorded from Kiso, where the type specimen is said to have been found and named accordingly.

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[1] Two forms of this species may be distinguished as follows:—forma *α*. **glabra,** Takeda—Planta tota levis; forma *β*. **pubescens,** Takeda—Petiolis, scapis pedicellisque molliter villosulis.

[2] *Sec.* T. Nakai, Fl. Koreana, ii, p. 78.

[3] The specimen from Quelpart (Faurie, no. 1900) belongs to the pubescent form.

The plant was in cultivation in Japanese gardens nearly two centuries ago. Its figure and description, together with figures of other species, such as *P. Sieboldii*, probably of *P. cuneifolia* var. *hakusanensis*, and *P. modesta*, are given in a book of gardening called *Chikin Shô Furoku*, vol. i, published in 1733. In this book the plant is called with a vernacular name "katsu-kô-sô," which means super-crimson flower, so named because the flower is of deep rose colour. This name is still in use amongst lovers of flowers.

Pax created a new section of *Primula* called *Fallaces*,[1] in which he includes in his latest work[2] four species, namely, *P. jesoana*, Miq., *P. kisoana*, Miq., *P. Reinii*, Fr. et Sav., and *P. tosaensis*, Yatabe. There is no room for doubt that the first two are allied, while the last two form another group. There exists no relationship whatsoever between these two sets of species. As I have said above, the first two species should be transferred into Pax's sect. *Sinenses*, whereas the other two may probably form a section of their own, on account of their general habit and especially of their long capsule. The capsule of *P. jesoana* does not exceed the calyx, but is as long as or slightly shorter than the calyx. Pax is also wrong in the key of sections in placing his *Fallaces* under the heading of "Folia non vel vix distincte lobata," since all the species which he includes in his *Fallaces* have leaves distinctly lobed.

P. TOSAENSIS, Yatabe. Plate XVIIA.

P. tosaensis, Yatabe, in Tôkyô Bot. Mag., iv (1890), No. 45, tab. 14; *id.* Iconogr. Fl. Japon., i (1891), 1, p. 31, tab. xii; Makino, in Tôkyô Bot. Mag. (1894), p. 174; Pax, in Engl. Pflanzenreich, iv (1905), p. 33.

This and next species undoubtedly form a group which is distinguished from the section *Sinenses* above all by the nature of capsule, which is often more than twice as long as the calyx.

This species is well characterised by Yatabe in the above cited publications, and also by Pax. As far as I am aware it has been recorded only from the Province of Tosa, Shikoku.

P. REINII, Fr. et Sav. Plate XVIIB.

P. Reinii, Fr. et Sav., Enum. Pl. Japon., ii, p. 428; Makino, in Tôkyô Bot. Mag. (1894), p. 174; Pax, in Engl. Pflanzenreich, iv (1905), p. 32.

This species is easily distinguished from other Japanese congeners by its almost circular leaf, which is deeply cordate at the base, so that it appears as if the leaf is peltate. The plant does not exceed 15 cm. even in the fruiting stage, and is usually much smaller. Young leaves are always densely clad with long, soft hairs. Inflorescence is composed of a few large showy flowers of deep rose colour with yellow eye.

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[1] In Engler's Bot. Jahrb., x (1888–9), p. 170.

[2] In Engler's Pflanzenreich, iv (1905), p. 32.

This species grows on mountains of Central Japan. It has been introduced into English gardens only in recent years.

P. MODESTA, Bisset et Moore. Plate XVIII.

P. modesta, Bisset et Moore (ampl.), *a.* **genuina,** Takeda.

Syn. :—

P. modesta, Bisset et Moore, in Journ. Bot., xvi (1878), p. 134.

P. farinosa, subsp. *modesta*, Pax, in Engl. Pflanzenreich, iv (1905), p. 85.

P. farinosa, var. *luteo-farinosa*, forma *japonica*, Fr. et Sav., Enum. Pl. Japon., ii, p. 429.

P. farinosa, var. *armena*, lusus *japonica*, Makino, in Tôkyô Bot. Mag., xi (1897), pp. 110, 111; (1902), p. 143.

P. Matsumurae, Petitm., in Bull. Herb. Boiss., vii (1907), p. 528 (fide spec. origin.).

Several names have been attached to this plant by different botanists, most of whom regard this species as a variety of *P. farinosa*, probably on account of the mealy nature of the leaf, etc. Our species differs, however, from the true *P. farinosa*, firstly, in the very slightly gibbose calyx, secondly, in the less saccate bracts, and thirdly, in sulphurous but not silvery farina. The flower is of rose, or (very seldom) white colour with yellow eye, and has peculiar scent.

The plant is found on mountains of various parts of Japan, extending from Yezo (Island of Rishiri) as far south as Shikoku (Mt. Ishidzuchi).

P. modesta, Bisset et Moore, *β.* **Faurieae** (Franch.), Takeda. Plate XIX.

Syn. :—

P. Faurieae, Franch., in Bull. Soc. Philom. Paris, 7 sér. x (1886), p. 146.; Pax, in Engler's Bot. Jahrb., x (1888), p. 211; *id.* in Engl. Pflanzenreich, iv (1905), p. 111.

P. farinosa, var. *Faurieae*, Miyabe, in Mem. Bost. Soc. Nat. Hist. (1890), p. 249; Makino, in Tôkyô Bot. Mag. (1897), pp. 100, 111; (1902), p. 143.

Professor Miyabe has already pointed out[1] that this plant does belong to Pax's sect. *Farinosae*, despite which Pax in his latest work still places this plant in sect. *Macrocarpae*. This variety differs from the typical form of *P. modesta* merely in the leaf, which is generally spathulate, and abruptly attenuated into a narrowly winged petiole, and is usually revolute and slightly or hardly denticulate on the margin. The length of capsule is, as in the typical form of the species, variable, so that no stress can be laid on this character at all.

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[1] Miyabe, in Mem. Bost. Soc. Nat. Hist. iv, no. 7 (1890), p. 250.

This variety is widely distributed over Yezo and the Kurile Islands, and is usually found on cliffs near the sea. It has, however, been recorded from Hontô, as growing on Mt. Iwate, Province of Rikuchu.

P. MACROCARPA, Maxim. Plate XX.

P. macrocarpa, Maxim., in Mel. Biol., vi (1867), p. 269; Fr. et Sav., Enum. Pl. Japon., i, p. 300.

Syn. :—

P. farinosa, var. *mistassinica*, Makino, in Tôkyô Bot. Mag. (1897), p. 111, nec Pax.

P. Hayaschinei, Petitm., in Bull. Herb. Boiss., vii (1907), p. 528.

This is perhaps the smallest species of all the Japanese Primulas. It comes near to the preceding species, but is easily distinguished by its much smaller size and efarinose character. As was pointed out by Professor Miyabe,[1] this species also does not belong to Pax's *Macrocarpae*. At first glance it appears to be identical with *P. mistassinica*, Michx., of North America, differing however in the far less and very slightly saccate bracts and nearly orbiculate-spathulate leaf, which is thinner in texture, sharply denticulate, and abruptly tapers into the petiole. The flower has been described as white with yellow eye by both Maximowicz and Pax. This is not correct. The flower is rose-coloured with yellow eye, as in the foregoing species.

Pax regards *P. nipponica*, Yatabe, as identical with *P. macrocarpa*, Maxim., but this is a mistake. His description[2] of *P. macrocarpa* is a chimæra of *P. macrocarpa*, Maxim., and *P. nipponica*, Yatabe.

The present species is one of the rarest, and is found only on Mt. Hayachine, Province of Rikuchu.

P. JAPONICA, A. Gray. Plate XXI.

P. japonica, A. Gray, Bot. Japan (1859), p. 400; Miq. Prol. Fl. Japon., p. 283; Hooker, in Bot. Mag., tab. 5916; André, in Illustr. Hort., xviii, p. 134, tab. 69; Regel, Gartenfl., xxi (1873), p. 31, tab. 1950–1; Fr. et Sav., Enum. Pl. Japon., i, p. 299; Pax, in Engl. Pflanzenreich, iv (1905), p. 125.

This is probably the best known species of the Japanese Primulas in Europe, so that I need not describe it in detail.

[1] Miyabe, in Mem. Bost. Soc. Nat. Hist., iv, no. 7 (1890), p. 250.

[2] Pax, in Engl. Pflanzenreich, iv (1905), p. 114.

This species readily produces a hybrid with *P. pulverulenta*, a Chinese species. In Japan this plant is distributed over the central and northern parts of Hontô and Yezo. I have not seen any specimen of the true *P. japonica* outside Japan.

P. EXIMIA, Greene. Plate XXIIA.

P. eximia, Greene, in Pittonia, iii (1897), p. 251; Pax, in Engl. Pflanzenreich, iv (1905), p. 106; Yabe et Yendô, in Tôkyô Bot. Mag. (1903), p. 229.

It is highly interesting to find this Arctic species in Japan. It has been recorded from the Island of Shimushu, the northernmost of the Kuriles. The characteristics of this plant are the glabrous, lanceolate, and entire leaf, and the undivided corolla-lobes of purple colour.

P. CUNEIFOLIA, Ledeb. Plate XXIIB.

There are three varieties of this species found in Japan, and they were at first described as distinct species. The species is easily distinguished from all other Japanese Primulas by its fleshy leaf and large crimson flower, the corolla-lobes of which are deeply divided into divaricate segments.

P. cuneifolia, Ledeb., *a.* **typica**, Makino, in Tôkyô Bot. Mag. (1902), p. 140, excl. syn. *P. saxifragaefolia*, Lehm.

Syn.:—

P. cuneifolia, Duby, in DC. Prodr., viii, p. 39.

P. cuneifolia, α. Dubyi, Pax, in Engl. Pflanzenreich, iv (1905), p. 112.

This is the typical form, and was first described by Ledebour nearly a century ago. The plant is, on the whole, smaller than the other forms, and the leaf has exclusively simple, large acute teeth on the margin, whereas in the other forms the dentation is often mixed with double teeth.

This form is found in Japan only, in Yezo and the Kuriles. Outside Japan it is distributed in Eastern Siberia.

P. cuneifolia, Ledeb., *β.* **hakusanensis,** Makino, in Tôkyô Bot. Mag. (1902), p. 141. Plate XXIIIA.

Syn.:—

P. hakusanensis, Franch., in Bull. Soc. Phil. Paris, 7 sér. x (1886), p. 144; Makino, in Tôkyô Bot. Mag. (1897), p. 112; (1899), p. 83; Pax, in Engl. Pflanzenreich, iv (1905), p. 113.

P. cuneifolia, Fr. et Sav., Enum. Pl. Japon., ii, p. 429, nec Ledeb.

This variety is characterised by sharp, shallow denticulation on the margin of the leaf. All other essential points agree well with those of the typical form of the species, so that it seems to me to be more natural to regard this as a variety.

The plant is found in the Alpine pastures on high mountains of Central and Northern Japan.

P. cuneifolia, Ledeb., γ. **heterodonta,** Makino, in Tôkyô Bot. Mag. (1902). Plate XXIIIB.

P. heterodonta, Franch., in Bull. Soc. Phil. Paris, sér. 7, x (1886), p. 145; Makino, in Tôkyô Bot. Mag. (1897), p. 112; (1899), p. 83; Pax, in Engl. Pflanzenreich, iv (1905), p. 112.

A luxuriant form of *P. cuneifolia.* The leaf is slightly thinner than that of the preceding variety, and has very obtuse, large teeth, which are often provided with denticulation.

This variety is found on high mountains of Northern Hontô.

P. NIPPONICA, Yatabe. Plate XXIV.

P. nipponica, Yatabe, in Tôkyô Bot. Mag., iv (1890), p. 3, tab. 13; *id.* Icon. Fl. Japon., i, 1, p. 35, tab. 13; Makino, in Tôkyô Bot. Mag. (1899), p. 82; (1902), p. 142.

Syn. :—

P. cuneifolia, Franch., in Bull. Soc. Phil. Paris, sér 7, x (1886), p. 144, nec Ledeb.

Another Japanese species with fleshy leaf. This is, however, easily distinguished from the other species of the same group by its smaller leaf with few simple, obtuse teeth, and corolla not exceeding 10 mm., white with yellow eye.

This is not uncommon on certain high mountains in Northern Hontô, growing in the Alpine pasture in abundance. It has been recorded nowhere outside Japan.

EXCLUDED SPECIES.

In the foregoing pages I have discussed all the recorded Japanese Primulas with the exception of the following four species :—*P. nivalis*, Pall., *P. prolifera*, Wall., *P. sibirica*, Jacq., and *P. veronicoides*, Petitm.

Blanc and Decrock [1] record the occurrence of the first three in Japan. They do not, however, give any evidence or reference to publications, so that it is difficult to see what source their statements have been derived from. At the present moment I can only discard these species from the flora of Japan until sufficient evidence confirms their being indigenous.

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[1] Blanc et Decr., Distribution des Primulacées, in Bull. Herb. Boiss. (1898), p. 681.

The fourth has been described by Petitmengin[1] from the Loochoo. This plant proves to be identical with *Stimpsonia chamaedrioides*, Wright.[2]

HYBRIDIZATION.

Hybridization is very common amongst Primulas. Even in the field, when two or more closely allied species grow together, hybridization often takes place, as in the Alps and elsewhere. In Japan, this has hardly been known, since different species grow in different localities, but not mixed together. As far as the breed is concerned all the species are pure. All the garden forms of *P. Sieboldii* have been produced only by natural crossing between different forms of the same species which is rather plastic in nature.

This species has been a favourite of plant growers over two centuries.

ANALYTICAL KEY TO SPECIES AND VARIETIES.

With the purpose of facilitating identification of the Japanese Primulas, I add a key to the species :—

Clavis Specierum Varietatumque Primularum Japonicarum.

1. Folia plus minusve lobata, distincte petiolata . . . 2.
Folia basi in petiolum attenuata, nec lobata . . . 6.

2. Folia oblonga vel ovato-oblonga, lobata, lobis numerosis. Calyx infundibuliformis, laciniis acutis patentibus, post anthesin accrescens. Rhizoma repens . *P. Sieboldii.*
Folia ambitu rotundata, reniformia, vel late ovata. Rhizoma erectum, breve . . . 3.

3. Planta saepe robusta, ultra 15 cm. alta. Calyx ultra medium fissus, lobis acuminatis . . . 4.
Planta tenuis. Calyx ad medium fissus . . . 5.

4. Planta plerumque altissima, glabrescens vel villosula. Folia reniformi-orbiculata, profunde cordata, palmate 5–7–9-lobata, lobis late triangularibus, acute denticulatis. Calyx glaber vel leviter hirtellus . . . . . *P. jesoana.*

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[1] Petitmengin, Sur une Primevère monocarpique du Japon., in Bull. Herb. Boiss. sér. 2, viii (1908), p. 108.

[2] *Apud* A. Gray, Bot. Japan (1859), p. 401, in Adnot.

Planta tota pilis pluricellulatis villosa. Folia reniformi-orbiculata, subtus dense villosissima. Calyx villosulus . . *P. kisoana.*

5. Folia oblongo-orbiculata vel late ovata, subtus ad nervos pubescentia, basi leviter cordata. Calycis lobi angusti, subulati, acuti . . . . . *P. tosaensis.*
Folia rotundata, profunde cordata, umbelliformia, molliter et dense pubescentia. Calycis lobi ovati, abrupte mucronulati . . . . . . *P. Reinii.*

6. Folia membranacea, plus minusve venosa . . . 7.
Folia carnosa, glaberrima. Planta tenuis . . . 11.

7. Folia subtus luteo-farinosa . . . . . 8.
Folia efarinosa . . . . 9.

8. Folia obovata vel obovato-spathulata, non revoluta, margine denticulata . . *P. modesta, α. genuina.*
Folia spathulata, rotundato-spathulata, basi abrupte in petiolum anguste alatum attenuata, revoluta, margine obsolete denticulata . . *P. modesta, β. Faurieae.*

9. Planta minima. Folia spathulata, infra 5 cm. longit. . . . . . *P. macrocarpa.*
Planta elata . . . . 10.

10. Folia obovato-oblonga, argute et irregulariter dentata. Calyx aperte campanulatus, lobis late triangularibus acuminatis . . . . . . *P. japonica.*
Folia oblanceolata, integra. Calyx anguste campanulatus. Corollae lobi integri . . *P. eximia.*

11. Folia paucies et obtuse dentata. Flores infra 10 mm. diam., albi . . . *P. nipponica.*
Folia saepe multoties et acute dentata vel denticulata. Flores ultra 10 mm. diam., purpurei; corollae lobi bipartiti, segmentis divergentibus . . . . 12.

12. Folia cuneata, acute et simplice dentata *P. cuneifolia, α. typica.*
Folia duplici-dentata vel denticulata . . . 13.

13. Folia obovata acute denticulata . *P. cuneifolia, β. hakusanensis.*
Folia late obovata, obtuse crenato-dentata, dentibus saepe denticulatis . *P. cuneifolia, γ. heterodonta.*

LIST OF PLATES.

Illustrating H. Takeda's Paper on the Japanese Primulas.

The plates are taken from photographs by Mr. R. M. Adam of dried specimens in the Herbarium of the Royal Botanic Garden, Edinburgh, with the exception of Plates XX and XXV supplied by Mr. Takeda.

PLATE XIV.	Primula Sieboldii, E. Morren.
XV.	Primula jesoana, Miq.
XVI.	Primula kisoana, Miq.
XVIIA.	Primula tosaensis, Yatabe.
XVIIB.	Primula Reinii, Fr. et Sav.
XVIII.	Primula modesta, Bisset et Moore.
XIX.	Primula modesta, Bisset et Moore, var. Faurieae, Takeda.
XX.	Primula macrocarpa, Maxim.
XXI.	Primula japonica, A. Gray.
XXIIA.	Primula eximia, Greene.
XXIIB.	Primula cuneifolia, Ledeb.
XXIIIA.	Primula cuneifolia, Ledeb., var. hakusanensis, Makino.
XXIIIB.	Primula cuneifolia, Ledeb., var. heterodonta, Franch.
XXIV.	Primula nipponica, Yatabe.
XXV.	Primula yuparensis, Takeda. Sp. nov.

ADDITAMENTUM.

While the foregoing paper was in the press the writer had an opportunity of receiving specimens of a *Primula* belonging to the *Farinosa* series, collected on the summit of Mt. Yuparo, Yezo, by Mr, H. Yanagisawa, a student of the Agricultural College, Tohoku Imperial University, at Satporo. As this plant has proved to be a new species, a description of it is given below.

The specimens of *P. eximia*, Greene, from the Island of Shimushu, which are preserved in the Herbarium of the Science College, Imperial University, Tôkyô, were closely examined, when the writer visited that country this summer. They agree very well with the description given by Pax in his monograph. This species is said to be exceedingly rare in Japan, only two specimens having been collected.

A new species of *Primula* belonging to the *Candelabra* section has lately been described from Formosa, under the name of *P. Miyabeana*, Ito et Kawakami.[1] Like other species of this genus only known from outside the Old Japan, this species is excluded from our consideration.

Primula yuparensis, Takeda. Sp. nov. Plate XXV.

Gracilis. Folia in sicco uti videtur plus minus carnosula, oblanceolata, acuta, basin versus sensim attenuata, acutata, margine plana, minute denticulata, glabra, venosa, subtus parce albo-farinosa, mox subefarinosa, $1\frac{1}{2}$–3 cm. longa, 5–10 mm. lata. Scapus folia valde superans, $4\frac{1}{2}$–6 cm. altus, superne parce albo-farinosus, umbellam pauci-(2- vel 3-) floram gerens. Bracteae subulatae basi rotundato-dilatatae, leviter saccatae, usque ad 7 mm. longae. Pedicelli graciles, in fructu plus minus elongati, stricti, plus minus farinosi. Calyx 7 mm. longus, urceolatus, viridis, minute nigro-punctatus, parce farinosus, ad medium fissus, lobis lanceolatis, acutis. Corolla purpurea, tubo calycem subduplo superanti, limbo 15 mm. diametienti, lobis obcordatis, emarginatis. Capsula calycem paulo superans.

Affinis *P. farinosae*, Linn., sed differt ab ea praesertim inflorescentia pauciflora, floribus majoribus, corollae tubo calycem valde superanti. Inter species japonenses prope *P. modestam*, Biss. et Moore, collocanda, a qua farina alba nec lutea, foliis vix petiolatis, inflorescentia pauciflora, floribus majoribus facile distinguitur.

Hab. in montibus Yuparo, ins. Yezo (H. Yanagisawa, 9 Aug. 1913).

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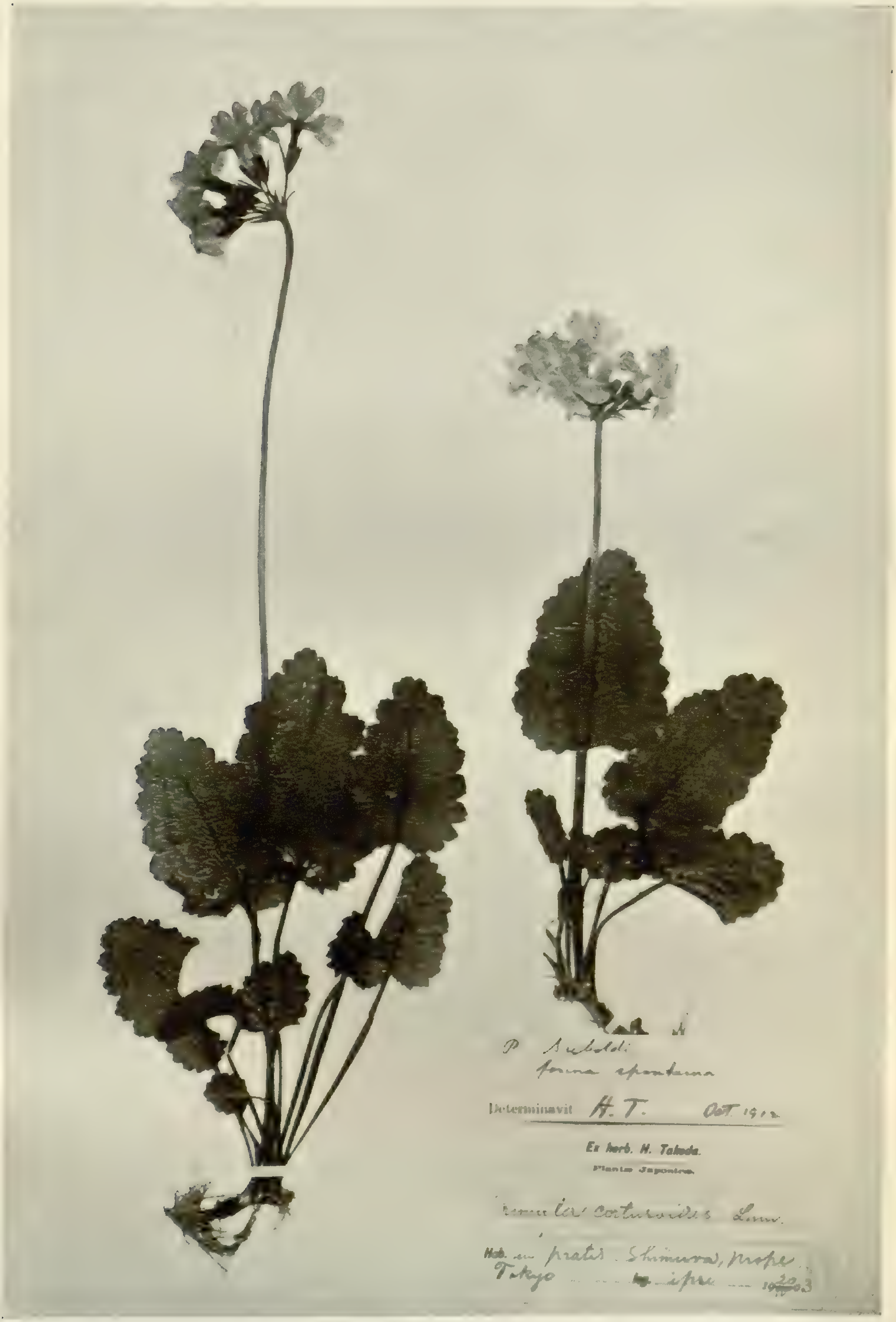
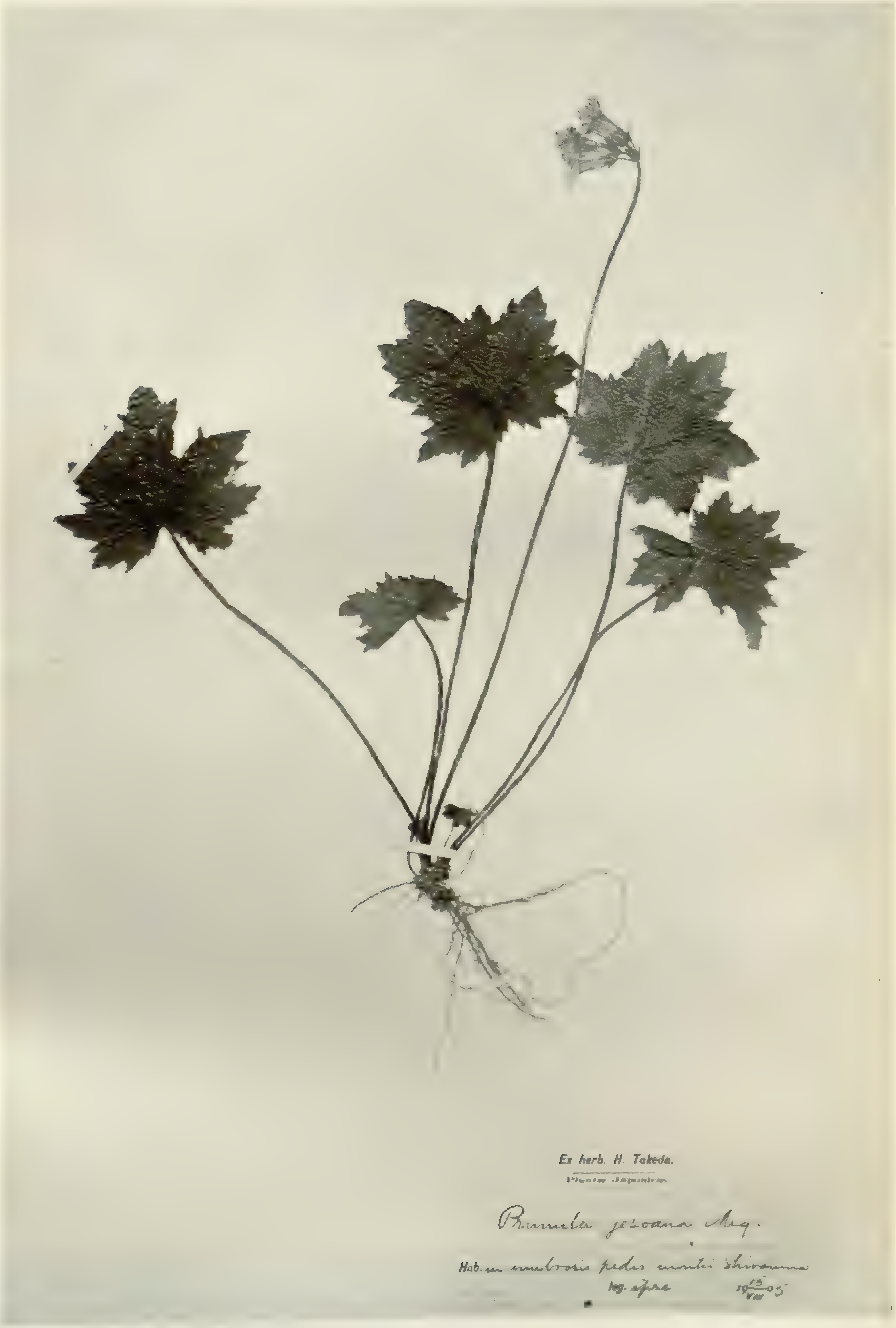
[1] Miyabe Festschrift, (1911) I, pl. xxix.

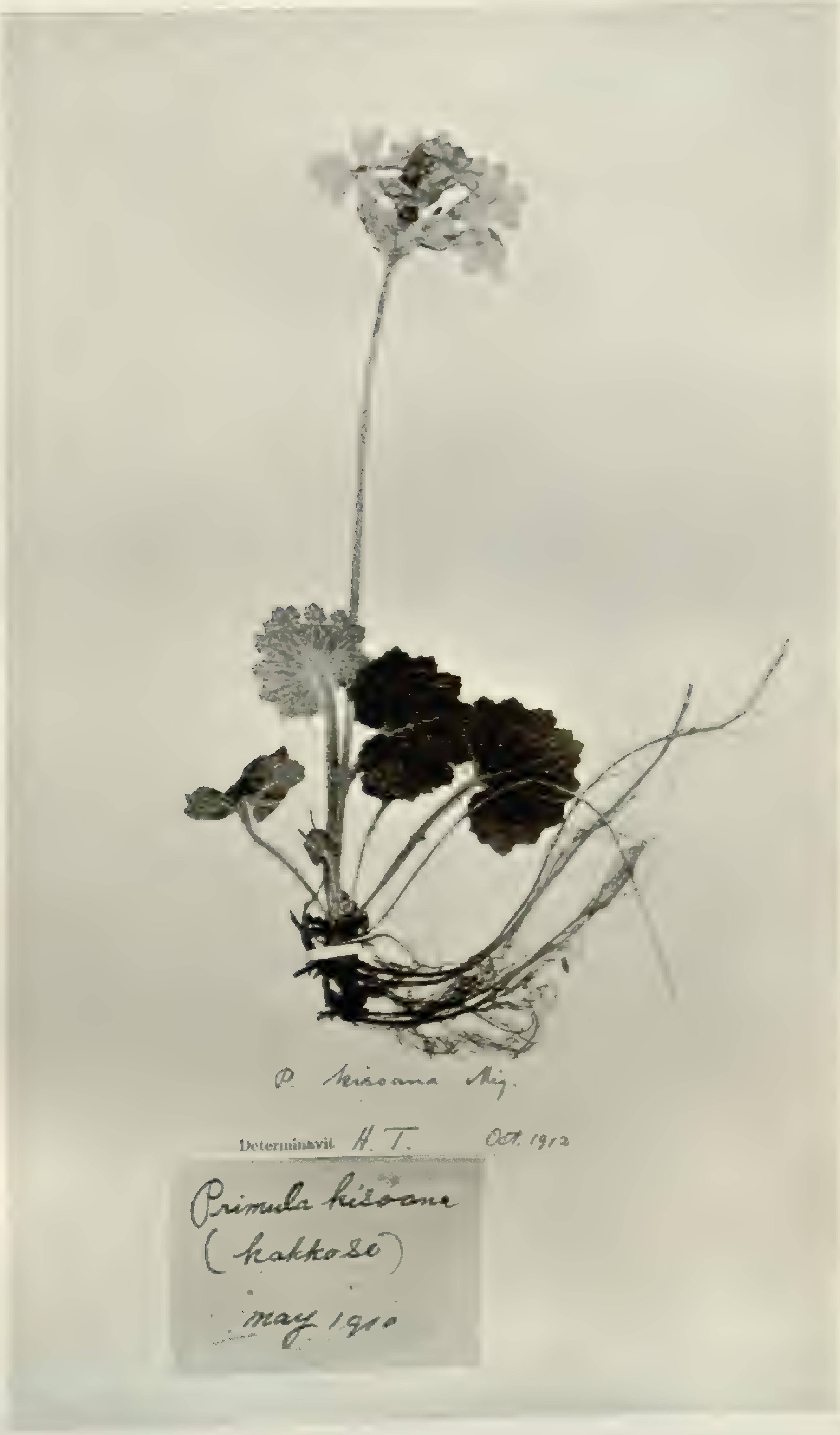

P. Sieboldi
forma spontanea
Determinavit H. T. Oct. 1912
Ex herb. H. Takeda.
Plantae Japonicae.
cortusoides Linn.
Hab. in pratis Shimura, prope
Tokyo ipse

PRIMULA SIEBOLDII, E. MORREN.

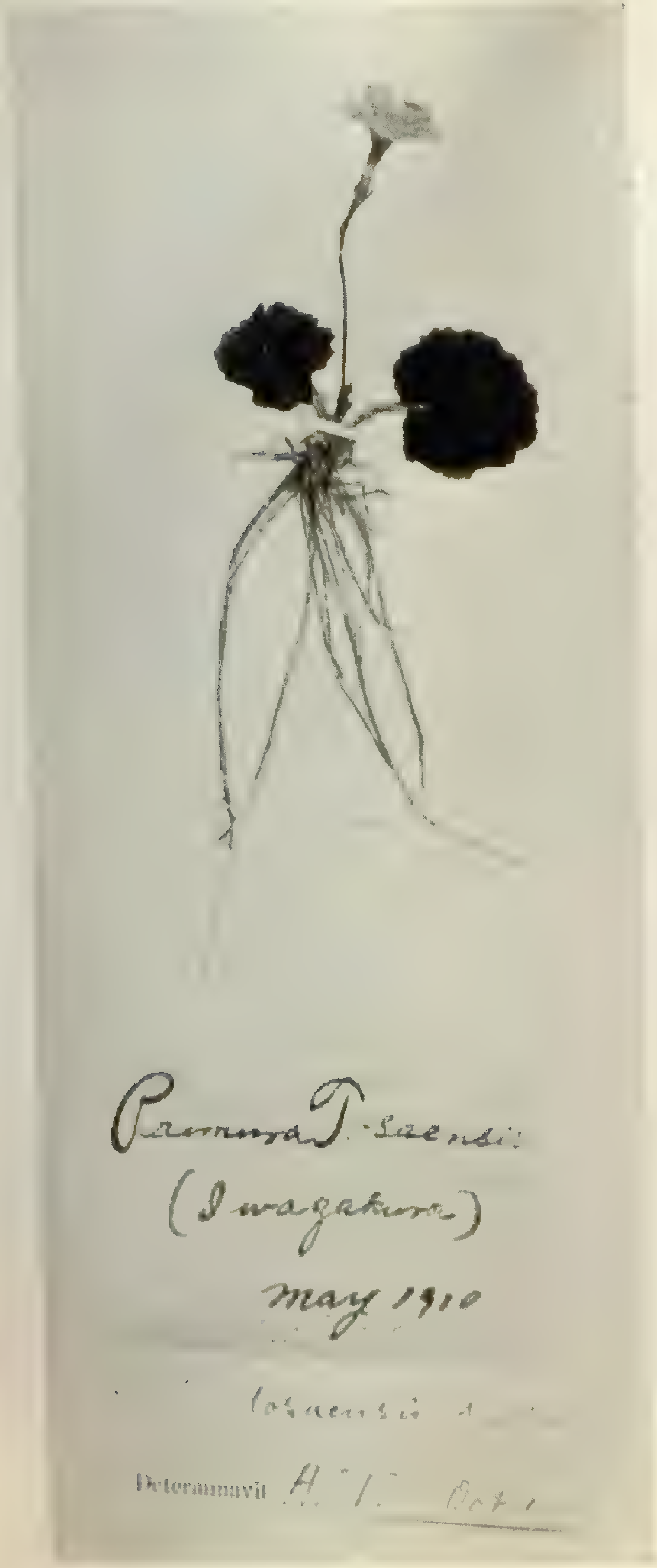

Ex herb. H. Takeda.
Plantae Japonicae
Primula jesoana Miq.
Hab. in umbrosis pedis montis Shirouma
leg. ipse
19 15/VII 05

PRIMULA JESOANA, MIQ.

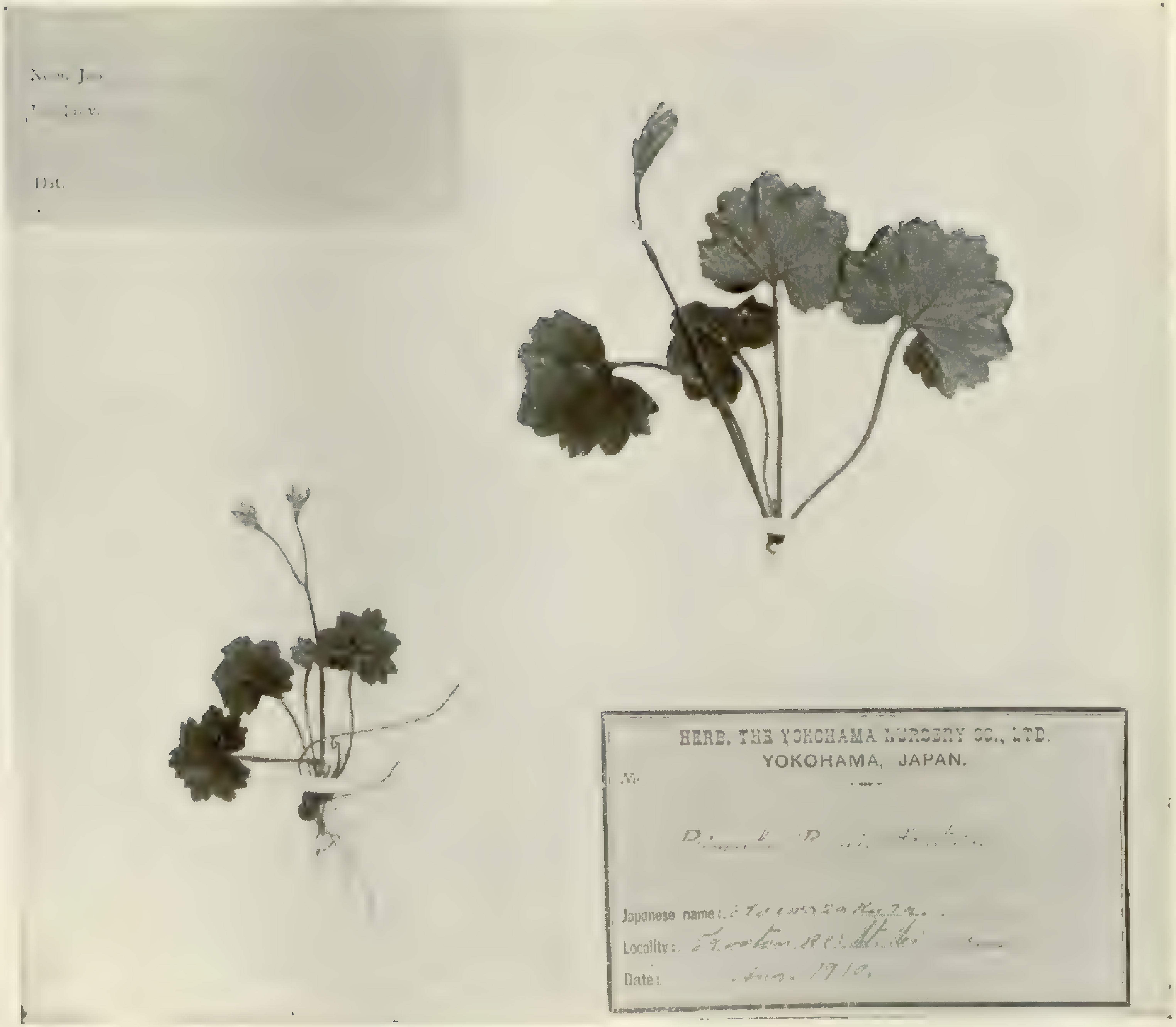
PLATE XVI.


P. kisoana Miq.
Determinavit H. T. Oct. 1912
Primula kisoana
(kakkoso)
may 1910

PRIMULA KISOANA, MIQ.


Primura T-saensis
(Iwagakura)
May 1910
tosaensis
Determinavit

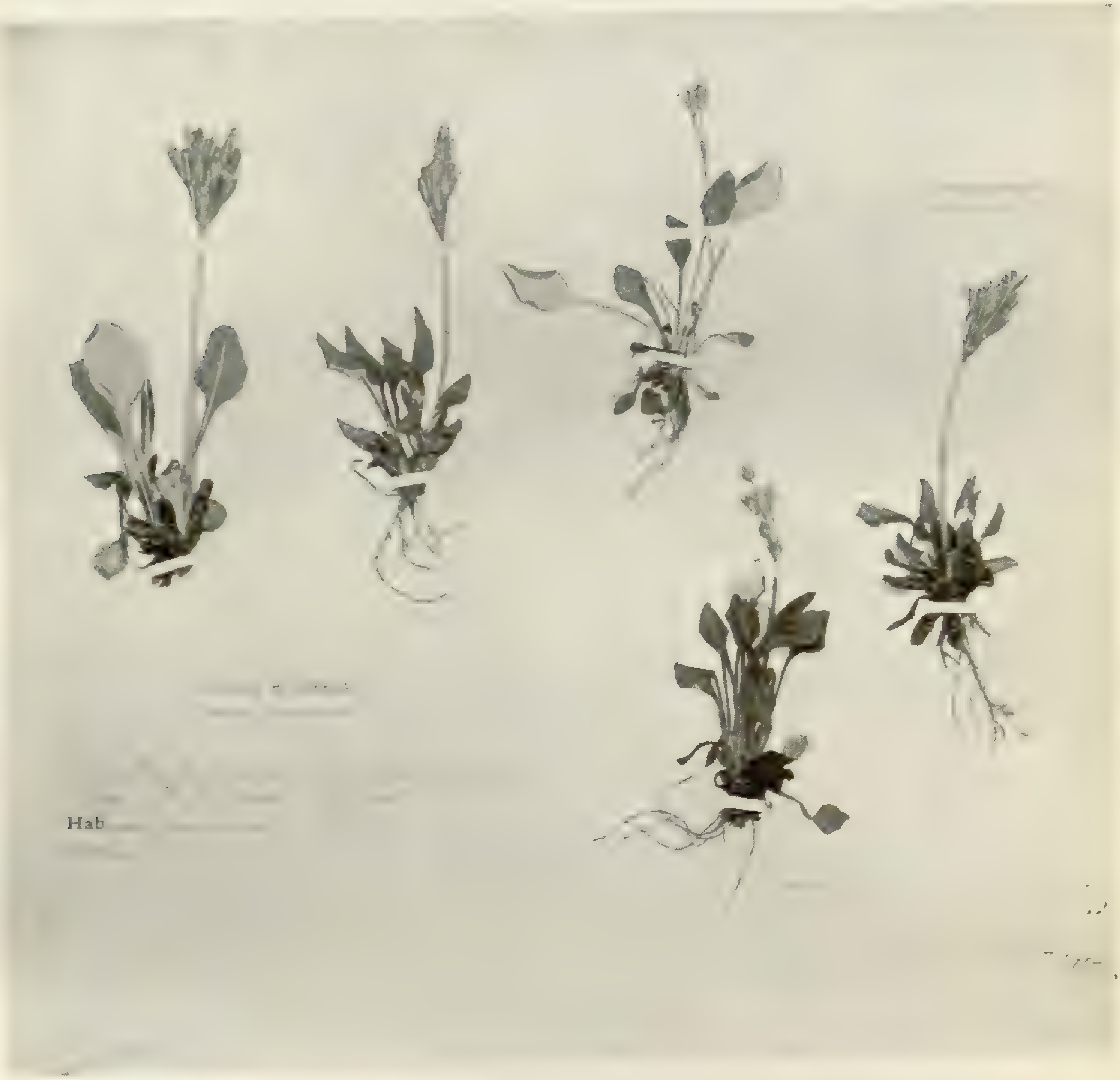
A.—PRIMULA TOSAENSIS, YATABE.


HERB. THE YOKOHAMA NURSERY CO., LTD.
YOKOHAMA, JAPAN.
No
Japanese name:
Locality:
Date:
1910

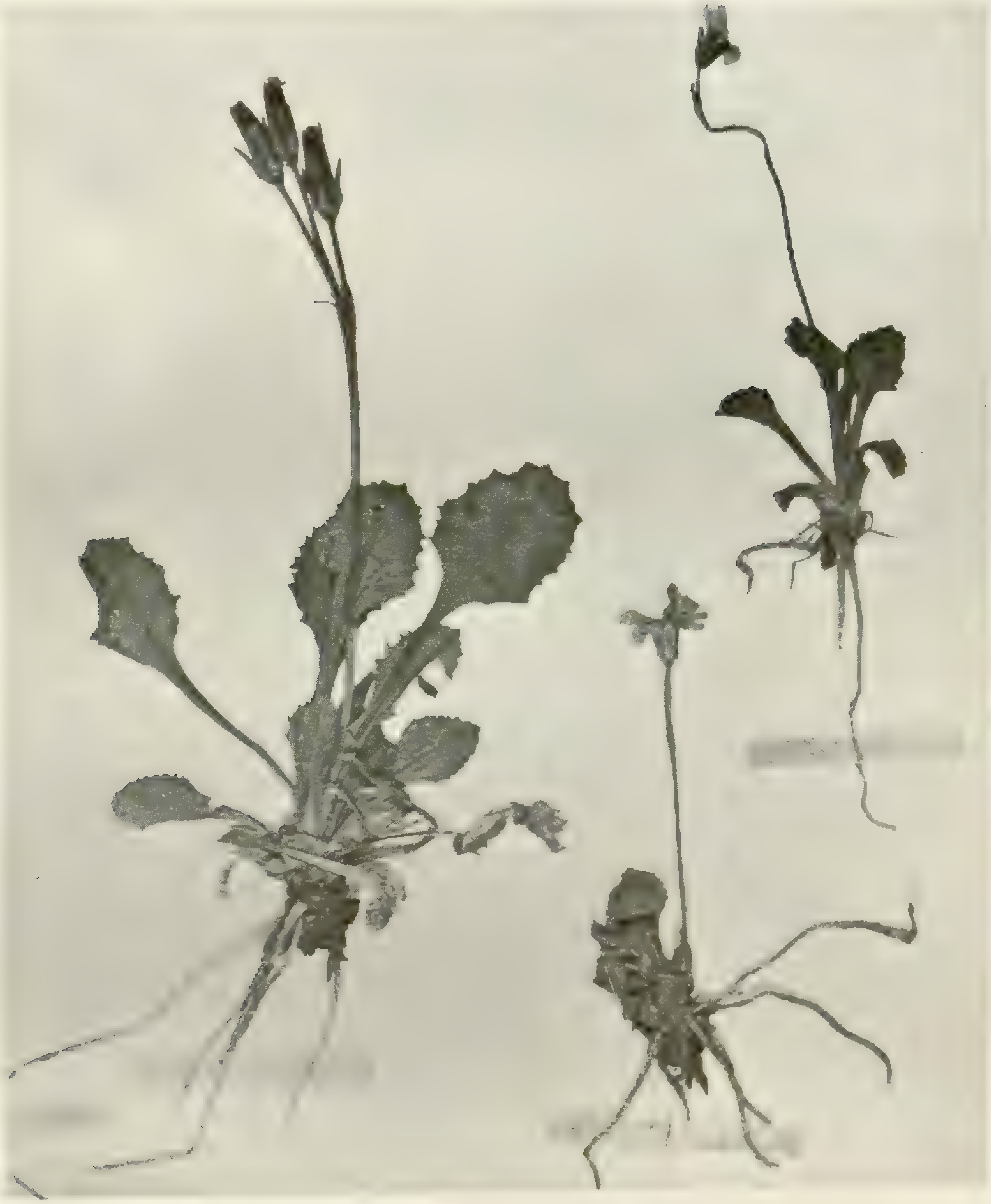
B.—PRIMULA REINII, FR. ET SAV.

P. modesta Bisset et Moore
Determinavit H. T. Oct. 1912
Primula Farinosa
(yukiwarisō)
may 1906

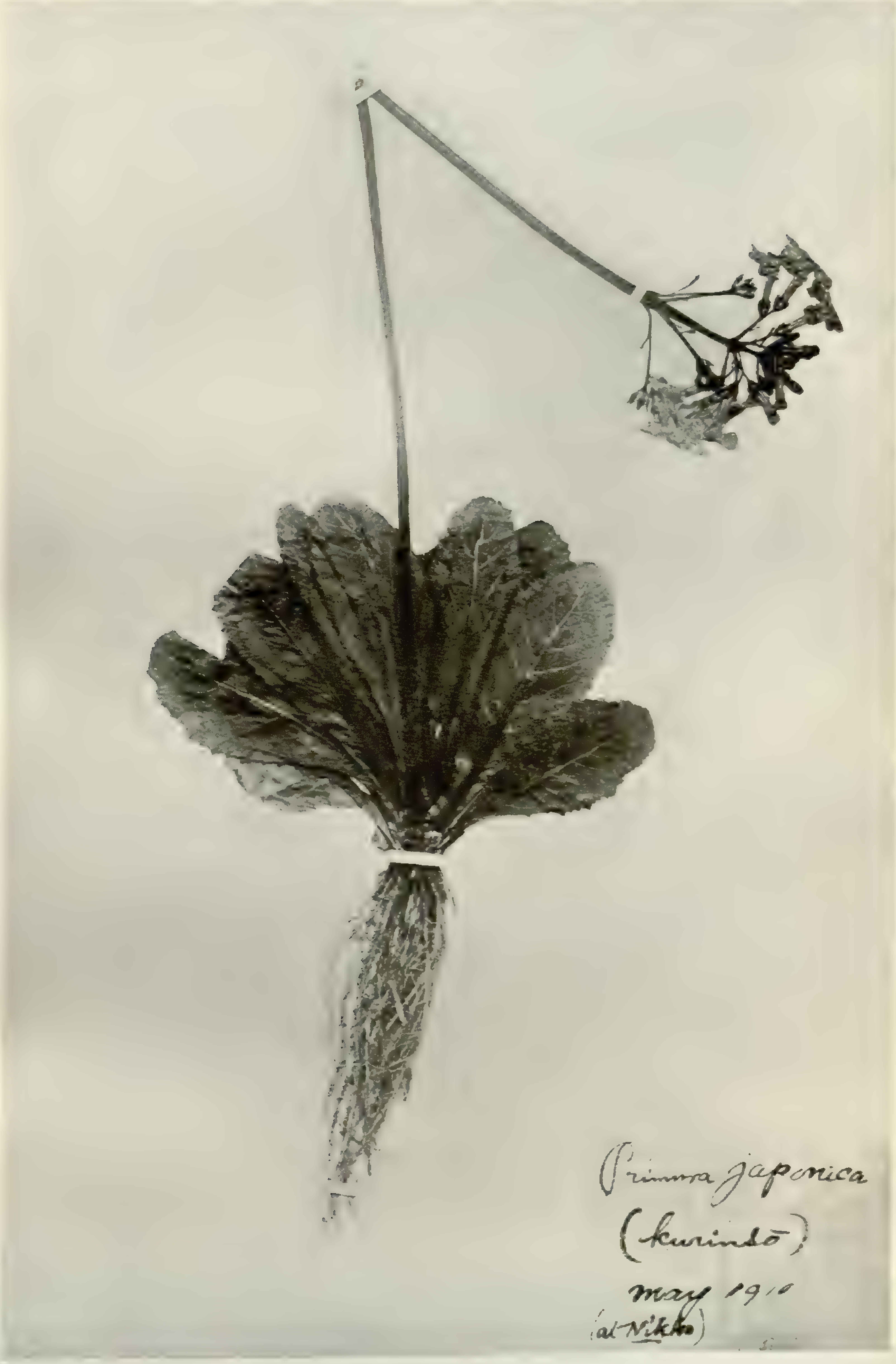
PRIMULA MODESTA, BISSET ET MOORE.



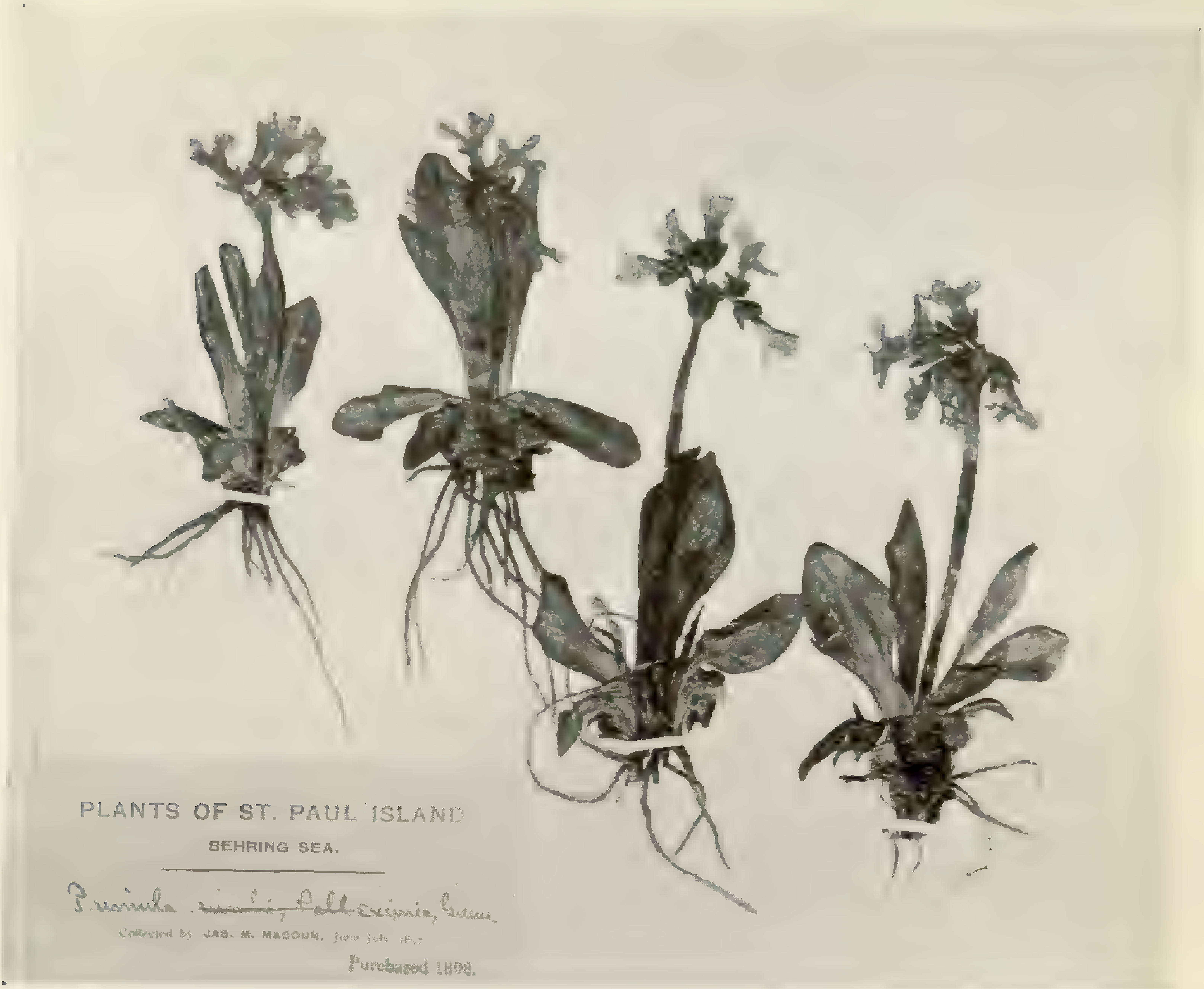
PRIMULA MODESTA, BISSET ET MOORE, VAR. FAURIEAE, TAKEDA.



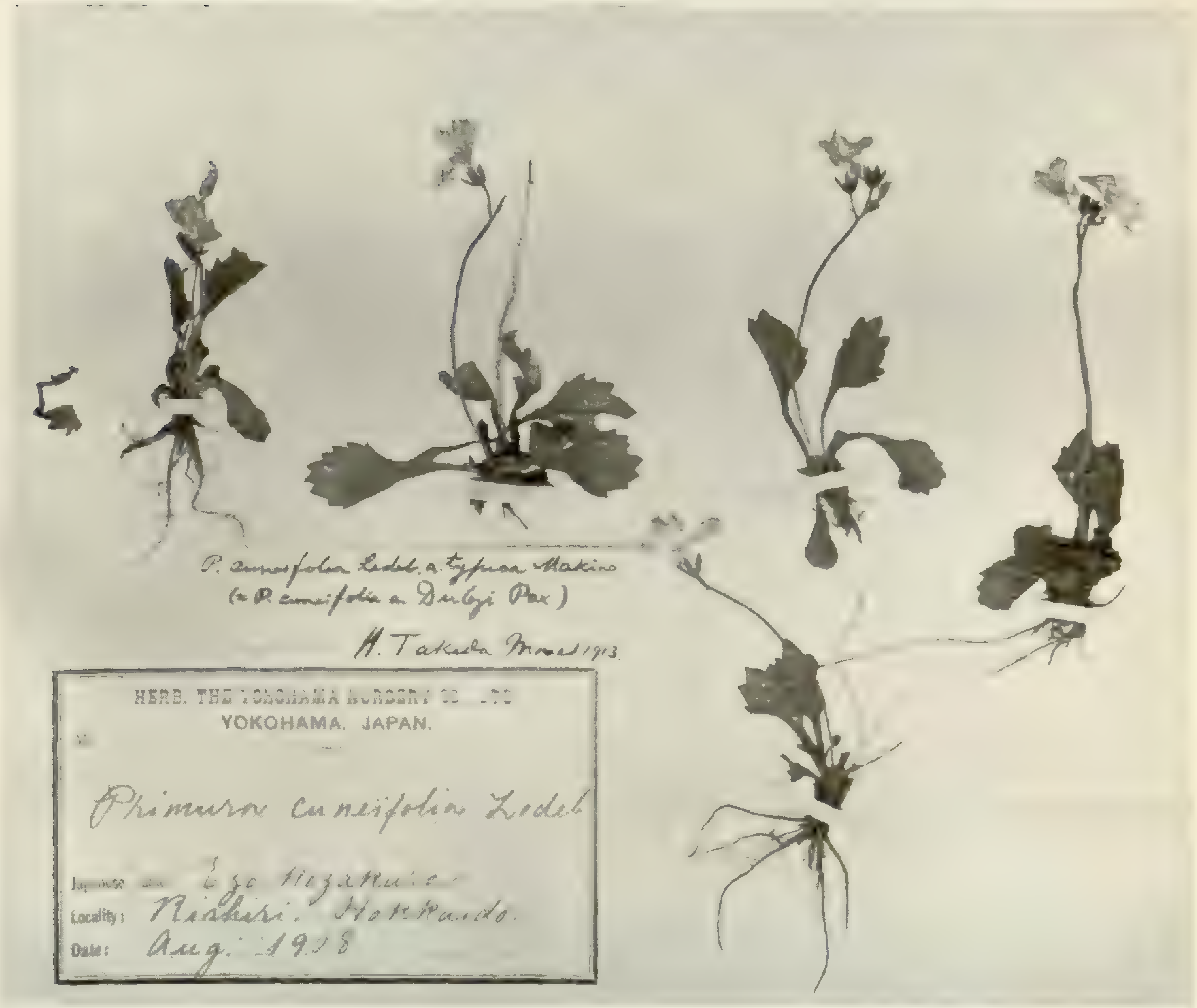
PRIMULA MACROCARPA, MAXIM.


Primura japonica
(kurinsō)
may 1910
(at Nikko)

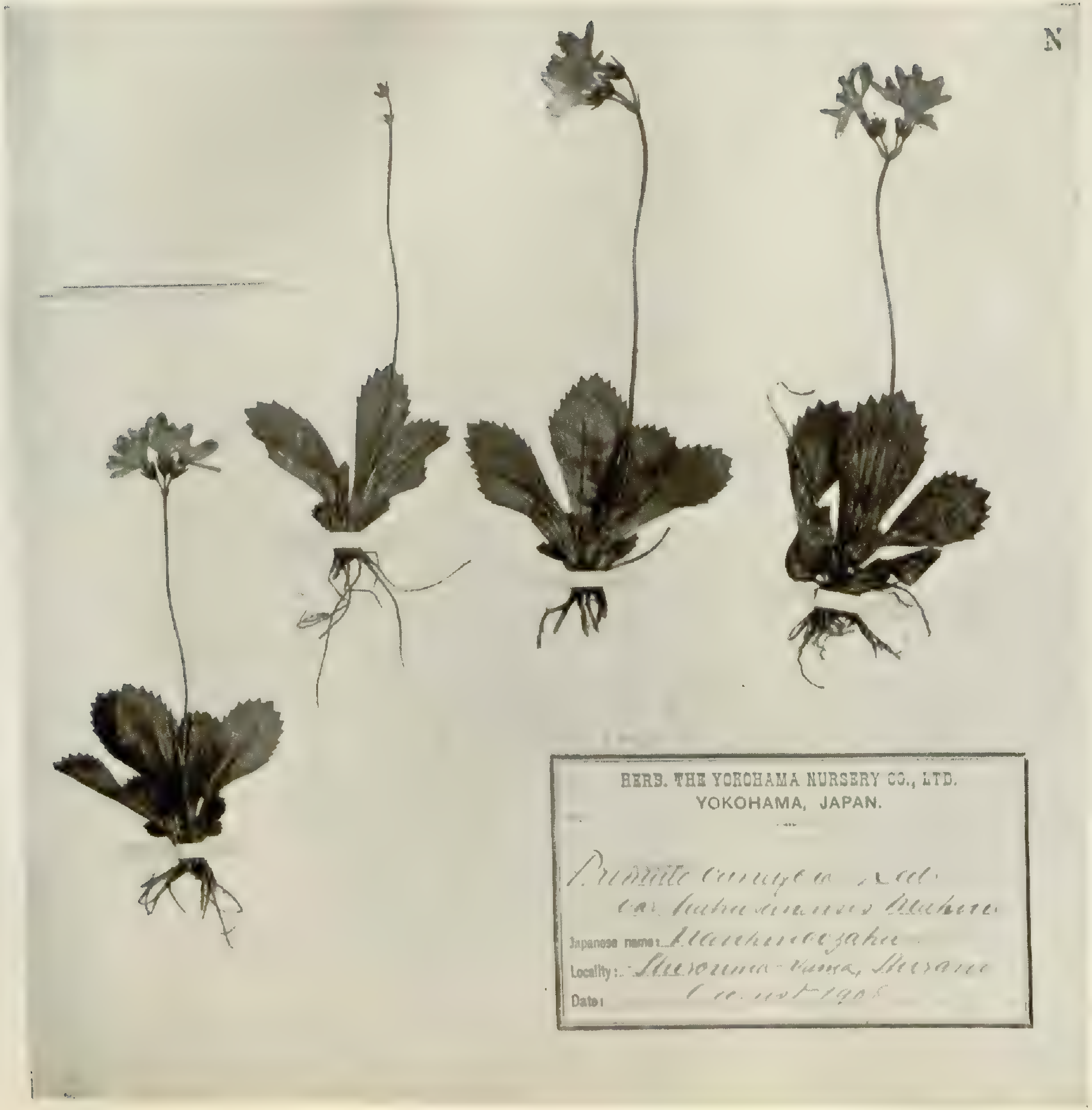
PRIMULA JAPONICA, A. GRAY.


PLANTS OF ST. PAUL ISLAND
BEHRING SEA.
Primula ~~[illegible]~~ eximia, Greene.
Collected by JAS. M. MACOUN. June July 18
Purchased 1898.

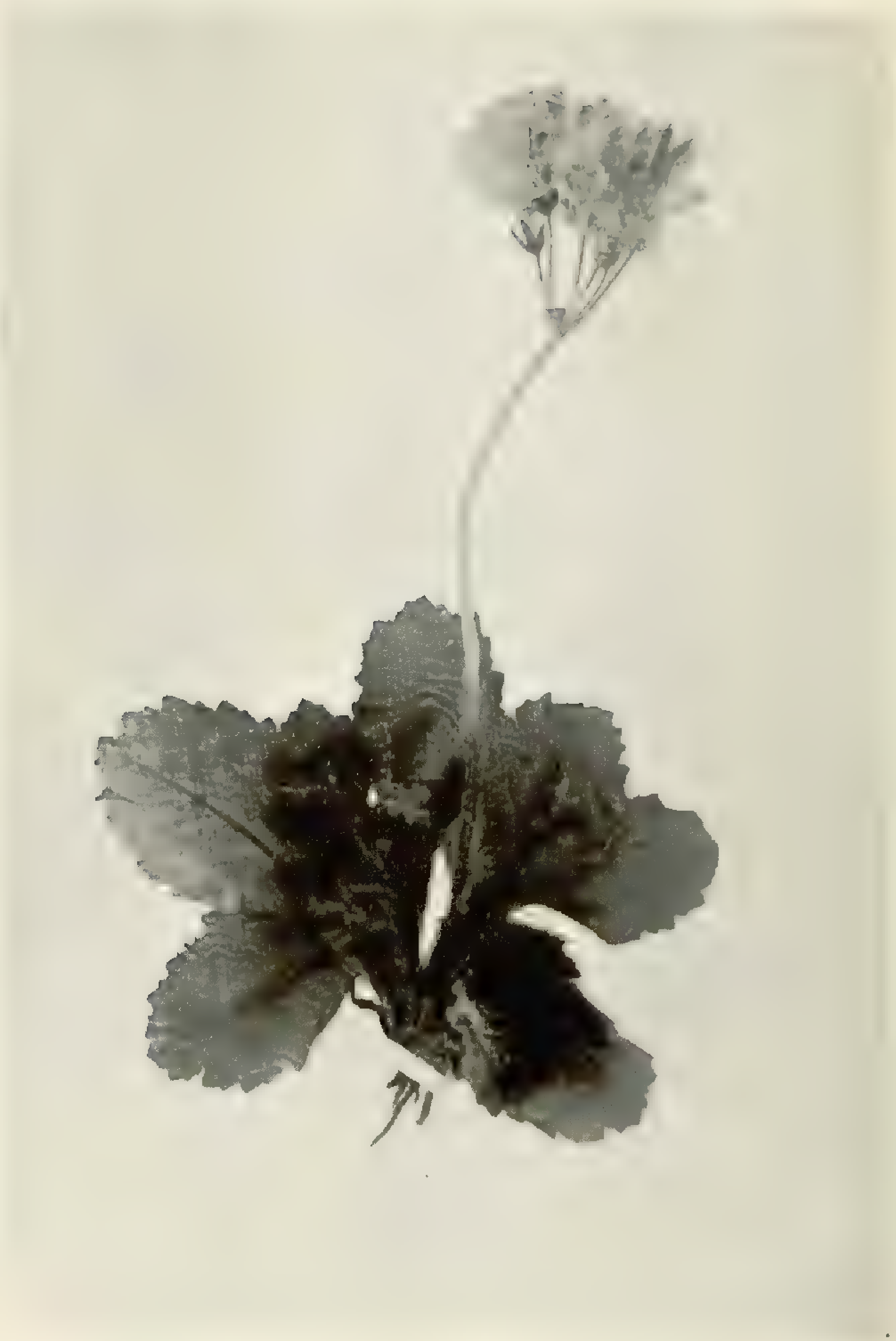
A.—PRIMULAEXIMIA, GREENE.


P. cuneifolia Ledeb. a typica Makino
(= P. cuneifolia a Dubyi Pax)
H. Takeda Mar 1913.
HERB. THE YOKOHAMA NURSERY CO. LTD
YOKOHAMA. JAPAN.
Primura cuneifolia Ledeb
Japanese name: Ezo kozakura
Locality: Rishiri. Hokkaido.
Date: Aug. 1908

B.—PRIMULA CUNEIFOLIA, LEDEB.


N
HERB. THE YOKOHAMA NURSERY CO., LTD.
YOKOHAMA, JAPAN.
Japanese name:
Locality:
Date:

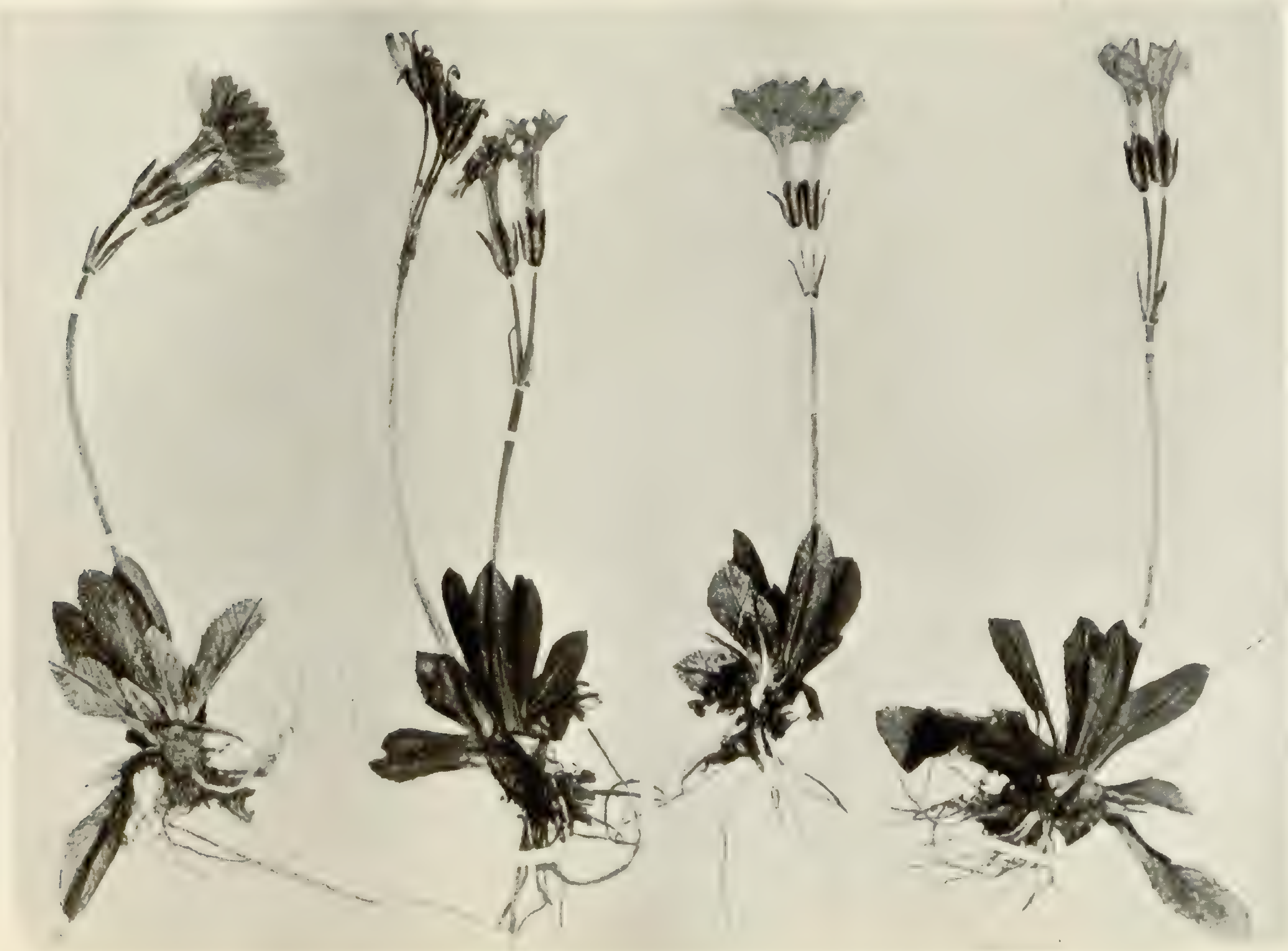
A.—PRIMULA CUNEIFOLIA, LEDEB., VAR. HAKUSANENSIS, MAKINO.



B.—PRIMULA CUNEIFOLIA, LEDEB., VAR. HETERODONTA, FRANCH.

rminavit H [illegible] Oct. 1912
Primula Nipponica
(hina-zakura)
may 1910

PRIMULA NIPPONICA, YATABE.



PRIMULA YUPARENSIS, TAKEDA.

Cladrastis and Maackia.

BY

H. TAKEDA, D.I.C.

With Plates XXVI–XXVII.

THESE two small genera of Leguminosae belong to the tribe Sophoreae and are more or less related to each other, so that *Maackia* has even been united with the other genus by some authors.[1] There are, however, several good reasons for regarding them as distinct genera.

The genus *Cladrastis* was established by Rafinesque in 1825 on the N. American plant which had formerly been known as *Virgilia lutea*, Michx. f. A second species was added to the genus in 1893 from China called *C. sinensis*, Hemsley,[2] and a third, *C. shikokiana*, Makino[3], from Japan. In 1872 Maximowicz published a new subgenus of *Sophora* under the name of *Platyosprion*, which the author raised to the generic rank soon afterwards.[4] In 1901 Makino transferred with right, though giving no reason, *Platyosprion* into the genus *Cladrastis*. Thus there have been known four species of this genus from Japan, China, and N. America. In the present paper I regard *Platyosprion* as a subgenus of *Cladrastis* ; the reason will be discussed later.

While *Cladrastis* is an Asiatico-American genus, *Maackia* is an exclusively Asiatic one, being distributed over Japan, Korea, China, and Amurland. The genus was instituted in 1856 by Ruprecht and Maximowicz in compliment to Richard Maack, who was then teacher of natural history at the gymnasium of Irkutzk, and who visited Amurland in 1855 on commission of the Siberian Section of the Imperial Geographical Society in St. Petersburg. Bentham, while compiling the Genera Plantarum, reduced this genus to *Cladrastis*, apparently without examining

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[1] Bentham, in Benth. et Hook, Gen. Pl. i, pt. ii, p. 554, and followed by many others.

[2] Hemsl., in Journ. Linn. Soc., Bot., xxix, p. 304.

[3] First named as *Sophora shikokiana*, Makino, in Tôkyô Bot. Mag. (1892), p. 53, and described in the same publication (1900), p. 56, and afterwards transferred to the present genus by the same author in the same periodical (1901), p. 62.

[4] *Sophora platycarpa*, Maxim., in Bull. Acad. Imp. Sc. St. Petersb., xviii, p. 393, and afterwards as *Platyosprion platycarpum*, Maxim., *ibid.*, xxii, p. 262.

[Notes, R.B.G., Edin., No. XXXVII, Nov. 1913.]

any actual specimen or consulting the original description, but depending simply on the figures given in Maximowicz's Primitiae Florae Amurensis.[1] At that time there was known only one species in each of these two genera, which seems to have impelled even Maximowicz later to consider that the characteristics of *Maackia amurensis* were only of specific difference but not of generic value.[2] All the species of this unfortunate genus published later have been described therefore under *Cladrastis*. The examination of all known species of *Maackia* and *Cladrastis* has led the present writer to the conclusion that *Maackia* should be retained as an autonomous genus, being characterised above all by the axillary unenclosed bud, opposite and subcoriaceous leaflets with few veins, strictly erect and compact racemes with small bracteate flowers, 4-lobed calyx, the standard very much thickened at the base, connate stamens, and strongly veined pod.

As to the *Platyosprion* there seem to be no reasons to regard it as a subgenus of *Sophora* or to retain it as a distinct genus. The bud enclosed in the swollen base of the leaf-stalk suggests at first glance that the plant would belong to *Cladrastis*, and the thin non-moniliform pod forbids the placing of it in *Sophora*. On the other hand, the only marked points which might separate *Platyosprion* from *Cladrastis* are the stipellate leaf and winged pod. These seem to me, however, of no generic value, since all other characters agree very well with those of *Cladrastis*. Maximowicz says[3] that the stamens of the *Platyosprion* are shortly connate at the base. This statement is, however, an erroneous one, since the dissection of the co-type specimens has shown that they are quite free at the base.

The genus *Cladrastis* is defined by the following characters :—

Cladrastis, Rafin. Neogenyton, p. 1 (1825) ampl.

Arbores magnae. Folia alternata, petiolata, imparipinnata, foliolis alternatis, membranaceis, pluricostatis, exstipellatis vel stipellatis. Inflorescentia terminalis saepe pendula, paniculata, bracteata, bracteis caducis, floribus conspicuis laxe dispositis, ebracteatis. Calyx cylindrico-campanulatus, 5-lobatus, lobis subaequalibus. Vexillum orbiculatum, emarginatum vel integrum, tenue, recurvum ; alae oblique oblongae, biauriculatae ; carina leviter incurva, petalis dorso arcte imbricatis, liberis, oblongis, semisagittatis. Stamina 10, libera, antheris versatilibus, quadrato-ellipticis. Ovarium stipitatum, pauci-ovulatum ; stylus leviter incurvus, subulatus, stigmate minuto, terminale. Legumen vel lineari-lanceolatum, exalatum atque margine tantum subincrassatum, vel oblongum atque utrinque alatum, plano-compressum,

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[1] Published in 1859.

[2] Maximowicz, in Bull. Acad. Imp. Sc. St. Petersb., xviii, p. 400.

[3] *Ibid.*, p. 399.

vix vel haud dehiscens. Semina oblonga, compressa, vix strophiolata, testa tenue, membranacea, brunnea. Gemma basi petioli inflatae innata.

The genus is further subdivided into two subgenera :—

Eucladrastis. Takeda. Folia exstipellata, subtus glauca. Legumen exalatum, margine tantum subincrassatum.

Platyosprion, Maxim., in Bull. Acad., Imp. Sc. St. Petersb., xviii, p. 398 (Sophorae subgenus). Folia stipellata, subtus viridula. Legumen secus utrumque marginem alatum, indehiscens.

KEY TO THE SPECIES.

1. Legumen exalatum. Folia exstipellata, subtus glauca . . . . . . 2.
Legumen utrinque alatum. Folia stipellata, supra pilosula, subtus viridula, tenuiter membranacea acuminata . 4. *C. platycarpa*, Makino.

2. Legumen longe stipitatum, maturum glabrum . . . . . . 3.
Legumen breviter stipitatum, maturum hirsutum. Foliola elliptico-lanceolata, obtusa vel acutiuscula, subtus juvenilia tomentosa adulta glabrescentia . 3. *C. sinensis*, Hemsl.

3. Folia plerumque 3-juga, foliolis ovatis vel late ovatis, breviter cuspidatis, obtusis, subtus parce pilosulis. Gemma ferrugineo-tomentosa . . . 1. *C. lutea*, C. Koch.
Folia plerumque 5-juga, foliolis ovato- vel elliptico-lanceolatis, subtus ad costam mediam pilosulis. Gemma aureo-tomentosa . . . 2. *C. shikokiana*, Makino.

ENUMERATION OF THE SPECIES.

1. **C. lutea,** C. Koch, Dendrol. i (1869), p. 6 ; Sargent, Gard. and Forest, ii, p. 375 ; Sylva of N. Am., iii, p. 57, tab. cxix, cxx.

SYN.—*Virgilia lutea*, Michx. f. Arb. Am., iii (1813), p. 266, tab. iii ; *C. tinctoria*, Rafin. Neogen. (1825), p. 1. ; DC. Prodr., ii, p. 98.

HAB.—N. America ; Hills near Nashville, Tennessee (A. Gattinger, fl. fr. Hb. Kew, Hb. Brit. Mus.), ad rupes prope Painted Rock, Tennessee (Rugel, Aug. 1842, fr. Hb. Kew), banks, Kentucky river (R. Petter, May, 1833, fl. fr. Hb. Kew), V. C. to Ga. and Fl. (S. B. Buckley, ex Hb. A. Gr., Hb. Brit. Mus.), calcareous cliffs of the Kentucky river (C. W. Short, fl. Hb. Kew).

OBS.—A tall tree with very showy flowers. Often cultivated in gardens. In its native country it is rare and local, being known in a wild state only from certain districts in eastern parts of the country.

2. **C. shikokiana,** Makino, in Tôkyô Bot. Mag. (1901), p. 62.

SYN.—*Sophora shikokiana*, Makino, l.c. (1892), p. 53 (nomen); (1900), p. 56.

HAB.—Japan, Mt. Tateyama, prov. Etchû (R. Yatabe, July 1884, steril. Hb. Kew, ex Hb. Coll. Sc. Imp. Univ. Tôkyô), Mt. Tsurugi, prov. Awa, Shikoku (T. Makino, in Hb. Yokohama Nurs. Comp., Aug. 1909, Hb. Edinb.); Mt. Mitsumine, prov. Musashi (Y. Yabe, Oct. 1900, fr. ex. Hb. Tôkyô).

OBS.—When describing this species under *Sophora*, Makino placed this in subgenus *Platyosprion*, which is not correct. The species is very closely related to the preceding, from which it is, when sterile, not easily distinguished. The flower has not yet been collected, but it is almost sure that its colour is purplish.

PLATE XXVI, figs. 14–15.

3. **C. sinensis,** Hemsl., in Journ. L. S., xxix (1893) p. 304.

HAB.—China: Western China (E. H. Wilson, n. 2392, fl., n. 2392a, fr. juv. Hb. Kew), Mt. Omi, W. China (E. H. Wilson, n. 4832, fl. Hb. Kew), West Szechuen, near Tachien lu (A. E. Pratt, n. 129, fl. defl. Hb. Kew), Central China (E. H. Wilson, n. 2398, fl. fr. Hb. Kew).

OBS.—According to the collectors the flower of this species is white. The pod has a comparatively short stalk and is covered with short hairs. The inflorescence sometimes reaches a large size, and its rachis and branches are covered with short, fine, rusty-coloured hairs.

PLATE XXVI, figs. 1–6.

4. **C. platycarpa,** Makino, in Tôkyô Bot. Mag. (1901), p. 62. C. K. Schneider, Illust. Handb. Laubholzk., ii, p. 16, fig. 10, l.q.

SYN.—*Sophora platycarpa*, Maxim., in Bull. Acad. Imp. Sc. St. Petersb. xviii (1872), p. 398; *Platyosprion platycarpum*, Maxim., l.c. xxii, p. 262.

HAB.—Japan: Fijiyama (Tschonoske in Max. Iter Secund., 1864, fl. fr. Hb. Kew ex Hb. Petrop.), prov. Awa in Shikoku (T. Makino, in Hb. Yokohama Nurs. Co., Aug. 1909, fr. Hb. Edinb.).

OBS.—The concolorous, stipellate leaflets and the winged pod distinguish this species from any other of the genus.

PLATE XXVI, figs. 7–13.

The genus *Maackia* is characterised as follows :—

Maackia, Rupr. et Maxim., in Bull. Phys.-Math. Acad. Imp. Sc. St. Petersb., xv (1856), p. 143, cum fig. anal. ; *Buergeria*, Miq. Prol. Fl. Japon., p. 241.

Arbores parvae vel magnae. Folia alterna, petiolata, imparipinnata, foliolis plerumque appositis, exstipellatis, subcoriaceis, pauci-costatis, subtus pallidioribus. Inflorescentia terminalis, racemosa, simplex vel basi ramosa, bracteata, bracteis deciduis, floribus multo atque dense dispositis, bracteatis. Calyx subinflatus, 4-lobatus, dente superiore majore. Vexillum orbiculato-obovatum, vel obovatum, vel cuneato-oblongum, emarginatum aut integrum, recurvum, basi incrassatum ; alae oblique oblongae hastatae ; carina leviter incurva, petalis dorso subcoalitis, liberis, oblongis, semisagittatis. Stamina 10, basi brevissime connata, antheris versatilibus, quadrato-ellipticis. Ovarium subsessile, pauci-ovulatum, dense hirtum ; stylus leviter incurvus, subulatus, stigmate minuto, terminali. Legumen subsessile, venosum, secus suturam ventralem alatum, plano-compressum, vel lanceolatum, vel oblongum, vel ellipticum, vel ovatum, vix dehiscens, hirsutum. Semina oblonga, compressa, testa tenui strophiolata, brunnea. Gemma axillaris, libera.

On examination of the co-type specimens, I reduce Miquel's *Buergeria*, which was established on a single species, *B. floribunda*.

KEY TO THE SPECIES.

1. Flores circiter 10 mm. lg. . . . . . 2.
Flores infra 7 mm. lg., foliola infra 5 cm. lg. 3 cm. lt. . . . . 4.

2. Folia 4–6-juga, foliolis semper mediocribus longit. 4 cm., latit. 2 cm. raro excedentibus, oblongo- vel elliptico-ovatis, basi truncato-rotundatis, apicem versus sensim attenuatis, acutatis, subtus juvenilibus hirtis, adultis glabris . 2. *M. Fauriei*, Takeda.
Folia 3–5-juga, foliolis variabilibus, aut parvis, aut magnis et usque ad 8 cm. lg. 5 cm. lt., aut ellipticis aut ovatis, basi vel cuneatis vel rotundatis . . . . 3.

3. Foliola adulta subtus glabra, basi saepe cuneata . 1. *M. amurensis*, Rupr. et Maxim. α. *typica*.
Foliola adulta subtus hirta, basi saepe rotundato-ovata . 1. *M. amurensis*, Rupr. et Maxim. β. *Buergeri*.

4. Folia adulta glabra . . . . 5.
Folia juvenilia utrinque adulta subtus hirta, foliolis ovalibus, basi cuneatis. Legumen ellipticum vel ovale, breve . 4. *M. Tashiroi*, Makino.

5. Folia juvenilia subtus hirta adulta glabra, foliolis ovatis vel ellipticis basi plus minus cuneatis. Flores breviter bracteati, bracteis brevissimis pedicello brevioribus. Legumen ut videtur submembranaceum, oblongum usque ad 6 cm. lg. 1 cm. lt., late alatum . 3. *M. floribunda*, Takeda.
Folia semper glabra, foliolis ovalibus basi cuneatis. Flores longe bracteati, bracteis subulatis, pedicello subduplo longioribus. Legumen coriaceum, ellipticum vel ovale, ad 3 cm. lg. ad 14 mm. lt., anguste alatum . 5. *M. australis*, Takeda.

ENUMERATION OF THE SPECIES.

1. **M. amurensis,** Rupr. et Maxim. *a.* **typica,** C. K. Schneid. Illust. Handb. Laubholzk., ii, p. 16, fig. 11, l—s.

SYN.—*M. amurensis*, Rupr. et Maxim., in Bull. Phys.-Math. Acad. Imp. Sc. St. Petersb., xv, p. 128.; *Cladrastis amurensis*, Benth., in Benth. et Hook., Gen. Pl., i, p. 554. K. Koch, Dendrol. i, p. 7. Maxim., in Bull. Acad. Imp. Sc. Petersb., xviii, p. 400.

HAB.—Amurland : Amur (Radde, fl. Hb. Kew, Maximowicz, fl., fr. Hb. Kew, Augustinowicz, Hb. Kew), Korbeckan, Amur (Maximowicz, 1859, fl. Hb. Brit. Mus.), Ussuri, Cap Chackzole (Maack, fl. Hb. Kew, Edinb.). Manchuria : coast, lat. 44–45 N. (C. Wilford, 1859, fl. Hb. Kew), Manchuria chinensis, fl. Amur, circa Tachalien (Karo, July 1905. fl. Hb. Brit. Mus.). Korea ; Seoul (Dunn, Sept. 1906, fr. Hb. Kew), fl. Jalu super. vallis Un-czchen-gan (Komarov, 1 July 1897, fl. Hb. Brit. Mus.), without exact locality (J. H. Veitch, 1892, fl. Hb. Kew).

PLATE XXVI, figs. 16–27.

β. **Buergeri,** C. K. Schneid., l.c., excl. syn.

SYN.—*Cladrastis amurensis* var. *Buergeri*, Maxim., in Bull. Acad. Imp. Sc. St. Petersb., xviii, p. 400, excl. syn.; *C. amurensis* var. *floribunda*, Maxim., apud Fr. et Sav., Enum. Pl. Japan., i, p. 113, excl. syn Shirasawa, Icon. Essenc. Forest, Japan, i, tab. 50, figs. 1–12.; *C. amurensis*, var. *Vidalii*, Fr. et Sav., l.c., ii, p. 327.

HAB.—Japan : Hondo, without locality(Savatier, n. 404, fl. Hb.

Kew), Yokohama (Maximowicz, 1862, fl., fr. Hb. Kew, Brit. Mus.), Fukujima, prov. Shinano (ex. Hb. Yokohama Nurs. Co., Aug. 1906, fl. Hb. Edinb.), Yezo, Hakodate (Maximowicz, 1861, fol. Hb. Kew, Albrecht, 1861, fl. Hb. Kew, Faurie, n. 5461, fr. immat. Hb. Brit. Mus.), Otaru (Faurie, n. 3303, fr. Hb. Kew, n. 6106, fr. Hb. Brit. Mus.), Satporo (Tokubuchi, Sept. 1890, fr. Hb. Kew, Takeda, Sept. 1907, fr. Hb. Edinb.).

PLATE XXVII, figs. 28–38.

OBS.—This species is very plastic with regard to the shape and size of leaflets, and even sometimes of petals. Sometimes leaflets are elliptical and cuneate towards the base, sometimes ovate and nearly truncato-roundish at the base. Their size varies exceedingly even in the same leaf. Franchet and Savatier, also Schneider, intend to distinguish varieties by the character of leaves, which seems to me to be quite impossible. The only point which separates the variety is the presence of the appressed brown persistent hairs on the under side of leaflet. It is rather singular that this species has not been recorded from Saghalien.

2. **M. Fauriei,** Takeda, comb. nov.

SYN.—*Cladrastis Fauriei,* Lévl., in Fedde, Repert., vii (1909), p. 230.

HAB.—Korea : Mt. Hallaisan, 1200 m., Quelpaert (Faurie, n. 1692, fl. Hb. Brit. Mus.).

OBS.—Among the known species this comes close to the preceding one, but differs by its leaf having 4–8 pairs (usually 6–) of leaflets smaller and uniform in size, truncato-roundish at the base, gradually tapering towards the apex, and its shorter calyx which does not exceed 3 mm. in length. The bract is very minute, measuring about 0·7—1 mm. long.

PLATE XXVII, figs. 39–43.

3. **M. floribunda,** Takeda, comb. nov.

SYN.—*Buergeria floribunda,* Miq., Prol. Fl. Japon., p. 241.

HAB.—Japan : probably Kyûshû, but without precise locality (ex. Hb. Lugduno-Batavo, fl., fr. Hb. Kew).

OBS.—Maximowicz wrongly reduced this species to *M. amurensis* as a variety, which caused some confusion in nomenclature later. This species is well characterised above all by the pod, which is the largest amongst the known species with a broad wing on the ventral suture, and, as far as the present material shows, thin in texture. The leaf has 4–6 pairs of leaflets which are elliptical or ovate, more or less cuneate at base, hairy underneath when young and glabrous afterwards, and uniform in size. This appears to be a rare species, for it has not been rediscovered since Miquel's time.

PLATE XXVII, figs. 44–50.

4. **M. Tashiroi,** Makino, Tôkyô Bot. Mag. (1902), p. 34.

SYN.—*Cladrastis Tashiroi*, Yatabe, in Tôkyô Bot. Mag., vi (1892), p. 345, tab. x.; *Derris chinensis*, Benth., in Journ. L. S., iv, Suppl., p. 104, et Fl. Hong Kong., p. 94, quoad spec. fructif.

HAB.—Japan: Fukuyejima, prov. Hizen (Makino, in Hb. Yokohama Nurs. Comp., Sept. 1908, fr. Hb. Edinb.). Loochoos: Ôshima (C. Wright, 1853,–56, fr. Hb. Kew, Faurie, n. 3910, fl. Hb. Brit. Mus.).

OBS.—Bentham (l.c.) hesitatingly refers the specimen collected by Wright in Ôshima to his *Derris chinensis*, which was established on a flower-bearing specimen gathered by Hance in Hong Kong. Even Hance's specimen has recently proved to be identical with *Millettia pulchra*, Benth., so that *Derris chinensis* can no longer exist. *M. Tashiroi* is an interesting species, and is distributed over Kyûshû and the Loochoos. The pod is elliptical or sometimes oval, which is brought about by the basal and terminal ovules being unfertilised.

PLATE XXVII, figs. 51–56.

5. **M. australis,** Takeda, comb. nov.

SYN.—*Cladrastis australis*, Dunn, in Kew Bull. Addit. Ser. x (1912), p. 86.; *C.* sp., Forb. et Hemsl., Ind. Fl. Sin., i, p. 201.

HAB.—China: without precise locality (Millett, fl. Hb. Kew), N.W. River, Kwantong (Lo Guai, comm., S. T. Dunn, Aug. 1890, fr. Hb. Kew).

OBS.—A remarkably glabrous species, and closely related to the preceding, from which it differs by the long bract which attains 5 mm. in length and is nearly twice as long as the pedicel, and by the calyx shorter and more deeply toothed. The leaflet is oval and mucronulate at the apex. The pod is elliptical in the typical case. The plant must have been introduced into this country many years ago, as I have seen a specimen in the Kew Herbarium from the garden of the Royal Horticultural Society, London, collected in 1835.

PLATE XXVII, figs. 57–62.

The present study has been carried out in the Herbarium, Royal Botanic Gardens, Kew. All the specimens preserved in the Herbarium of the British Museum have also been consulted. Prof. Bayley Balfour has been so kind as to send all the specimens of the Edinburgh Botanic Garden for examination. Mr. S. Matsuda of the Botanical Institute, Imperial University, Tôkyô, has also generously given me valuable information, and sent me specimens of *C. shikokiana*, and the co-type specimen of *M. Tashiroi*.

EXCLUDED SPECIES.

There is a plant described by Franchet as *Dalbergia Delavayi*,[1] which was subsequently excluded by Prain from this genus and relegated to *Cladrastis*.[2] So far as the writer can make out from Franchet's description, the plant, if it is a *Cladrastis*, resembles *C. sinensis*, Hemsl., differing, however, by the length of the pedicel and the size of the fruit. However, his description of the androecium[3] would not admit of its being a *Cladrastis*. For the present the writer is inclined to leave out this plant from consideration until the original specimen is closely examined.

ADDITAMENTUM.

After I had finished writing the present article Mr. W. G. Craib of Kew kindly placed in my hands specimens of the two genera I have been describing, collected by E. H. Wilson in Western China. Examination of them has convinced me that each of the genera is enriched by a new species.

The new *Cladrastis* (*C. Wilsonii*, Takeda), so closely resembles *C. shikokiana*, Makino, that it is not an easy matter to distinguish the two by foliage alone. The Chinese species possesses, however, a pod very shortly stipitate, broader than in the other species (10–12 mm.), and hirsute. The flower is almost as large as that of *C. lutea*, Koch, and as far as I can judge from the dried material, is pale purplish, and the standard is marked with a yellow spot.

The *Maackia* (*M. chinensis*, Takeda) is to be placed between *M. amurensis*, Rupr. et Maxim., and *M. Fauriei*, Takeda, and is more closely allied to the latter by its foliage. It differs from its nearest ally in having a slightly larger flower, longer bract, and densely hirsute leaf (the full-grown leaf is hirsute only underneath). The fruit, which affords a good distinguishing character, is unfortunately unknown. The ovary contains about 6 ovules.

The full descriptions of these two new species will be published in the "Plantae Wilsonianae."

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[1] Franch.; Pl. Delav., p. 186 (1889).

[2] Prain, in Ann. Roy. Bot. Gard., Calcutta, x, p. 109 (1905).

[3] "Stamina 9 (10 ?) monadelpha."

EXPLANATION OF PLATES XXVI–XXVII.

Illustrating H. Takeda's Paper on Cladrastis and Maackia.

All figures of leaflets and pods are of natural size.

FIGS. 1– 6. *Cladrastis sinensis*, Hemsl. : 1 = keel, ×4 ; 2 = wing, ×4 ; 3 = standard, ×4 ; 4 = ovary, ×4 ; 5 = leaflet ; 6 = pod.

FIGS. 7–13. *Cladrastis platycarpa*, Makino : 7 = pod ; 8 = wing, ×4 ; 9 = keel, ×4 ; 10 = standard, ×4 ; 11 = calyx laid open, seen from inside, ×4 ; 12 = ovary, ×4 ; 13 = leaflet.

FIGS. 14–15. *Cladrastis shikokiana*, Makino : 14 = pod ; 15 = leaflet.

FIGS. 16–27. ***Maackia amurensis*****, Rupr. et Maxim., *α typica.*,** 16 = keel, ×5 ; 17 = wing, × 5 ; 18 = standard, ×5 (Maack, Amur) ; 19 = wing ×5 ; 20 = keel, ×5 ; 21 = standard, ×5 (Veitch, Korea) ; 22 = leaflet (Radde, Amur) ; 23 = wing, ×5 ; 24 = keel, ×5 ; 25 = standard, ×5 (Maximowicz, Amur) ; 26 = leaflet (Augustinowicz, Amur) ; 27 = pod.

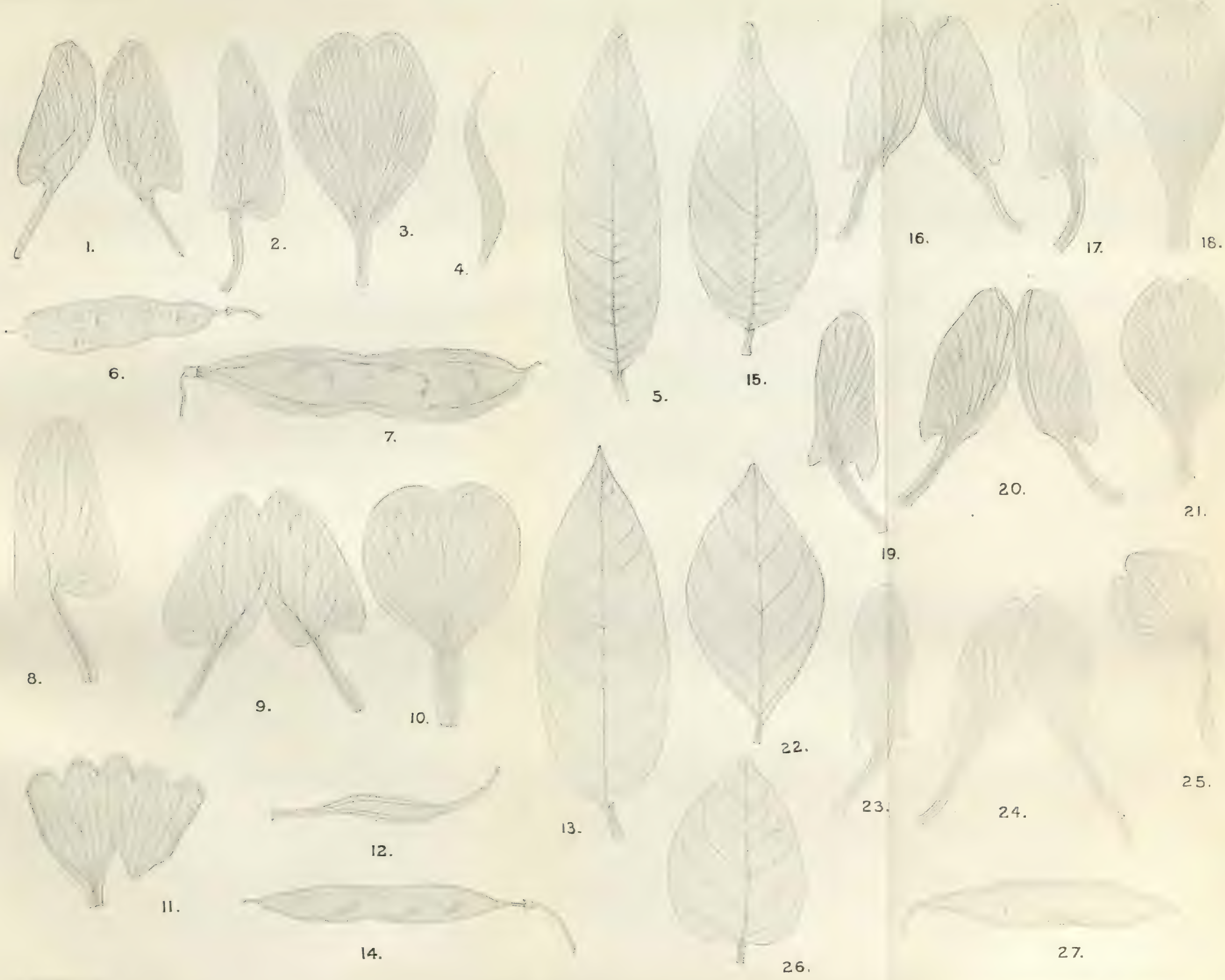
FIGS. 28–38. *Maackia amurensis*, Rupr. et Maxim., *β. Buergeri* : 28 = flower, ×5 ; 29 = keel, ×5 ; 30 = wing, ×5 ; 31 = standard, ×5 (Albrecht, Hakodate) ; 32 = keel, ×5 ; 33 = wing, ×5 ; 34 = standard, ×5 (Savatier, Japan) ; 35, 38 = leaflets near apex of the leaf (Maximowicz, Yokohama) ; 36 = do., near apex of leaf (Albrecht, Hakodate) ; 37 = do., near base of the leaf.

FIGS. 39–43. *Maackia Fauriei*, Takeda : 39 = wing, ×4·5 ; 40 = petal of keel, ×4·5 ; 41 = standard, ×4·5 ; 42 = calyx, ×4·5 ; 43 = leaflet.

FIGS. 44–50. *Maackia floribunda*, Takeda : 44 = flower, ×6 ; 45 = keel, ×6 ; 46 = standard, ×6 ; 47 = wing, ×6 ; 48 = pod ; 49, 50 = leaflets.

FIGS. 51–56. *Maackia Tashiroi*, Makino : 51 = flower on inflorescence, ×6 ; 52 = pod ; 53 = standard, ×4·5 ; 54 = wing, ×4·5 ; 55 = keel, ×4·5 ; 56 = leaflet.

FIGS. 57–62. *Maackia australis*, Takeda : 57 = flower, ×5 ; 58 = keel, ×5 ; 59 = wing, ×5 ; 60 = standard, ×5 ; 61 = leaflet ; 62 = pod.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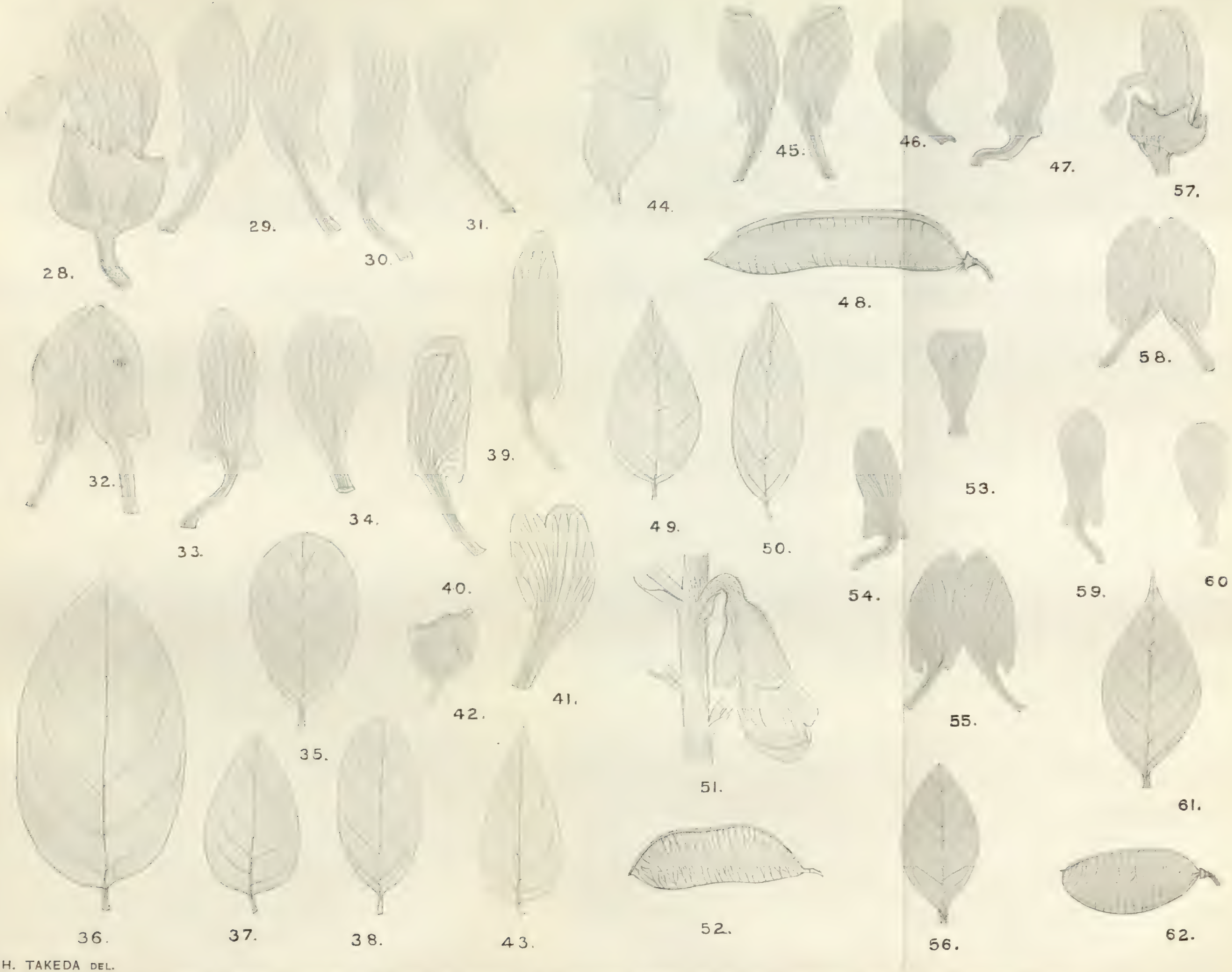
H. TAKEDA DEL.

FIGS. 1-6, CLADRASTIS SINENSIS, HEMSL.; 7-13, C. PLATYCARPA, MAKINO; 14-15, C. SKIKOKIANA, MAKINO; 16-27, MAACKIA AMURENSIS, RUPR. ET MAXIM.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H. TAKEDA DEL.

FIGS. 28-38, MAACKIA AMURENSIS, RUPR. ET MAXIM., β. BUERGERI; 39-43, M. FAURIEI, TAKEDA; 40-50, M. FLORIBUNDA, TAKEDA 51-56, M. TASHIROI, MAKINO 57-62, M. AUSTRALIS, TAKEDA.

DIAGNOSES.

Specierum novarum chinensium in herbario Horti Regii Botanici Edinburgensis cognitarum.

I-L.

The species described in this series are :—

Androsace Wardii, W. W. Sm., p. 129.
Arenaria lichiangensis W. W. Sm., p. 110.
Arenaria roseotincta, W. W. Sm., p. 111.
Astragalus Balfourianus, N. D. Simpson, p. 123.
Astragalus Forrestii, N. D. Simpson, p. 124.
Astragalus lichiangensis, N. D. Simpson, p. 125.
Astragalus pullus, N. D. Simpson, p. 125.
Braya Forrestii, W. W. Sm., p. 119.
Buddleia heliophila, W. W. Sm., p. 126.
Buddleia nana, W. W. Sm., p. 126.
Cardamine ? verticillata, J. F. Jeffrey et W. W. Sm., p. 120.
Codonopsis efilamentosa, W. W. Sm., p. 107.
Codonopsis subglobosa, W. W. Sm., p. 108.
Cremanthodium bupleurifolium, W. W. Sm., p. 112.
Cyananthus lichiangensis, W. W. Sm., p. 109.
Cypripedilum Wardii, Rolfe, p. 128.
Delphinium calcicolum, W. W. Sm., p. 130.
Delphinium Beesianum, W. W. Sm., p. 130.
Draba alpina, Linn., var. involucrata, W. W. Sm., p. 121.
Gentiana atuntsiensis, W. W. Sm., p. 121.
Gentiana Wardii, W. W. Sm., p. 122.
Jasminum subhumile, W. W. Sm., p. 127.
Lactuca Forrestii, W. W. Sm., p. 112.
Lactuca funebris, W. W. Sm., p. 113.
Listera Wardii, Rolfe, p. 127.
Lonicera chlamydophora, W. W. Sm., p. 109.
Megacarpaea Delavayi, Franch., var. minor, W. W. Sm., p. 121.
Nepeta complanata, Dunn, p. 122.
Nervilia tibetensis, Rolfe, p. 128.
Onosma confertum, W. W. Sm., p. 106.
Onosma Forrestii, W. W. Sm., p. 107.
Pedicularis atuntsiensis, Bonati, p. 135.
Pedicularis pseudo-ingens, Bonati, p. 135.
Saussurea loriformis, W. W. Sm., p. 114.
Saussurea quercifolia, W. W. Sm., p. 115.
Saxifraga atuntsiensis, W. W. Sm., p. 132.
Saxifraga consanguinea, W. W. Sm., p. 132.
Saxifraga finitima, W. W. Sm., p. 133.
Saxifraga flexilis, W. W. Sm., p. 134.

Saxifraga Wardii, W. W. Sm., p. 134.
Senecio cymbulifer, W. W. Sm., p. 115.
Senecio latihastatus, W. W. Sm., p. 116.
Senecio orotrephes, W. W. Sm., p. 116
Senecio pteropodus, W. W. Sm., p. 117.
Senecio remipes, W. W. Sm., p. 117.
Senecio sciatrephes, W. W. Sm., p. 118.
Silene rosiflora, Kingdon Ward, p. 111.
Spiraea calcicola, W. W. Sm., p. 131.
Tanacetum quercifolium, W. W. Sm., p. 119.
Wikstroemia lichiangensis, W. W. Sm., p. 136.

BORAGINEAE.

Onosma confertum, W. W. Sm. Sp. nov.

Species affinis *O. paniculato,* Bur. et Franch. ; foliis angustioribus insertione angustissima, subtus dense albo-tomentosis, filamentis glabris inter alia distincta.

Planta 60–100 cm. alta, erecta. Caules plures e radice crassa lignosa orti, simplices, foliis basalibus numerosis subdeflexis in glebam circ. 10 cm. diamet. arcte compactis basi velati ; caulis inferior foliis omnino celatus ; medianus et superior subteres, pube duplici vestitus, scilicet setis albidis e tuberculo ortis et capillis crebris brevibus albidis, sat foliosus praesertim in regione mediana. Folia basalia primo ascendentia lineari-lanceolata vel -oblanceolata, 10–15 cm. longa, 1–1.25 cm. lata, acuta vel acuminata, basi in petiolum brevem cuneatim attenuata, margine revoluta, supra dense scabride adpresso-setulosa, capillis albidis intermixtis, infra tomento denso albido detersili praedita ; costa supra immersa, infra eminens, nervi obscurissimi ; folia basalia vetustiora, semi-marcida, deflexa, caulem omnino velantia ; folia caulina circ. 10 cm. longa, circ. 5 mm. lata, linearia, erecta et cauli subadpressa, insertione angustissima sessilia. Inflorescentia terminalis 20–30 cm. longa, angusta, vix patens, e cymis scorpioideis racemose dispositis composita ; bracteae primariae 2.5–5 cm. longae, ovato-lanceolatae, ceterum foliis caulinis similia ; bracteae secundariae multo minores ; pedunculi sub anthesin circ. 5 cm. longi, 5–12–flori, cum pedicellis circ. 1 cm. longis dense setulosi. Calyx circ. 1 cm. longus, ad basin usque in lobos quinque lineares partitus, dense setulosus. Corolla 1.5 cm. longa, anguste tubulosa, rosea, extus pube densa cinerascente praedita, lobis circ. 1 mm. longis, late triangularibus obtusis. Stamina infra medium tubum inserta, inclusa, filamentis filiformibus glabris, antheris cohaerentibus. Stylus filiformis glaber, vix vel paululum exsertus. Fructus deest.

"Plant of 2–3½ ft. Flowers soft rose. Dry arid situations in the mountains enclosing the Langkong river. Alt. 8000–9000 ft. Lat. 26° 10′ N. August 1910. Yunnan." G. Forrest. No. 6436.

3232 **Onosma Forrestii,** W. W. Sm. Sp. nov.

Species affinis *O. paniculato,* Bur. et Franch. et *O. conferto,* W. W. Sm. sed corollâ minore, intus basi annulo capillorum longorum alborum praedita, antheris liberis inter alia distincta.

Specimen mancum vidi. Folia eis *O. conferti* subsimilia sed minus albo-tomentosa. Inflorescentia densior quam apud congeneres citatos, undique densissime albido-setulosa. Calyx circ. 1 cm. longus, in lobos quinque lineares partitus, dense setulosus. Corolla vix calyce longior, anguste tubulosa dense adpresse albido-setulosa; lobi 2 mm. longi ovati acuti; corolla interior lineis quinque albo-tomentosis fere ad basin percursa; ad basin tubi squamae nectariferae rotundatae, longe albo-tomentosae, annulum formantes. Stamina ad quartam corollae partem libera, filamentis filiformibus glabris, antheris liberis, apice acutis. Stylus filiformis tandem paululo e corollâ exsertus, glaber vel minute sparse pilosulus.

Grown by Bees Limited, July 1912, from seeds sent by their collector G. Forrest in 1910 from Yunnan, Western China. This species is closely allied to *Onosma paniculatum,* Bur. et Franch. and *O. confertum,* but differs altogether in the details of the flower.

CONVOLVULACEAE.

Codonopsis efilamentosa, W. W. Sm. Sp. nov.

Species habitu affinis *C. rotundifoliae,* Royle, et *C. viridi,* Wall.; corollâ alte fissâ ad *C. convolvulaceam,* Kurz, appropinquat, ceterum valde diversa.

Planta scandens, 60–150 cm. longa. Caules volubiles glabri. Folia alterna, rarius superne opposita, ad 4.5 cm. longa, ad 3.5 cm. lata, late ovata, basi alte aequaliter cordata, minora saepe rotundata, acuta vel subacuta, margine obtusissime sinuato-dentata, utraque facie glabra, supra viridia nervis obscuris, infra glaucescentia nervis paulo eminentibus; petioli 1 cm. longi vel paulo ultra, glabri. Flores terminales et axillares, satis numerosi; pedunculi glabri ad 3 cm. longi. Calyx superus; tubus obconicus glaber 4–6 mm. longus; lobi sinu acuto sejuncti, triangulari-ovati, acuti vel subacuti, glabri, circ. 1 cm. longi, circ. 4 mm. lati. Corolla subglobosa vel cylindrico-globosa, caerulea, fere ad basin in lobos quinque lanceolatos subacutos circ. 2 cm. longos, circ. 8 mm. in medio latos divisa. Antherae circ. 4 mm. longae, glabrae, sessiles. Stylus glaber vix 2 mm. longus ; stigma latum trilobum ; discus luride purpureus, marginibus lobatis albo-ciliatis praeditus. Fructus deest.

"Scandent plant of 2–5 ft. Flowers blue. On scrub in dry situations on the eastern flank of the Lichiang Range. Lat. 27° 30′ N. Alt. 10,000 ft. July 1910." G. Forrest. No. 6258.

A very distinct species presenting no peculiarities in its vegetative parts, but with a deeply cleft corolla which recalls that of *Codonopsis convolvulacea,* Kurz. The sessile anthers serve to distinguish the species from all the others of the genus.

Codonopsis subglobosa, W. W. Sm. Sp. nov.

Species *C. foetenti,* Hook. f. et Thoms. valde affinis ; calyce setuloso, corollâ viridi inter alia differt.

Herba perennis scandens 15–30 cm. alta. Radix crassa elongata lignosa ; caules e radice plures subrobusti, sparsius albo-setosi mox glabrescentes, volubiles. Folia opposita vel alterna, 10–15 mm. longa, 8–10 mm. lata, late ovata, basi rotundata, vix cordatula, obtusa, serratula vel subintegra, undique plus minusve dense adpresse albo-setulosa ; petioli 1–2 mm. longi, setosi. Flores terminales ; pedunculi 5–15 cm. longi, ebracteati, albo-setosi. Calyx semisuperus ; tubus hemisphaericus, 7 mm. longus, jugis quinque magnis, quinque parvis, omnibus albo-setosulis, instructus, ceterum glaber ; lobi 8–10 mm. longi, 4–5 mm. lati, sinu lato obtuso sejuncti, lanceolati, subacuti, integri vel serratuli, intus subglabri, nisi ad apicem setulosam, extus setosiores praesertim ad apicem sed nonnunquam subglabri. Corolla supera, globoso-campanulata, viridis ; tubus glaber, circ. 2 cm. longus, in sicco 3 cm. latus, intus viridis, basi atro-purpureus ; lobi 5–10 mm. longi, late triangulares, subacuti. Filamenta glabra, basi dilatata, 4 mm. longa ; antherae glabrae, 4 mm. longae. Stylus glaber ; stigma 3–4-lobum ; lobi fere rotundati, circ. 6 mm. diametro. Ovarium post anthesin semi-inferum. Capsula matura deest.

"Scandent plant of 6–12 inches. Flowers green, blotched maroon at base. Growing on scrub at the base of the eastern flank of the Lichiang Range. Lat. 27° 20′ N. Alt. 9000 ft. September 1910. Yunnan, West China." G. Forrest. No. 6684.

Also cultivated by Bees Limited from seed supplied by G. Forrest.

C. subglobosa is closely allied to *C. foetens* Hook. f. et Thoms. of the East Himalaya, and in the dried state is easily confused with that species. Having seen the Himalayan plant frequently in the wild state, and the Chinese plant in cultivation, I have no hesitation in keeping the two distinct. I believe Soulié 125, 540, and Pratt 531 in Herb. Kew., placed with *C. foetens* by Chipp in his "Revision of the Genus Codonopsis," Journ. Linn. Soc. xxxviii. p. 378, are the same as Forrest, No. 6684.

C. subglobosa is distinguished by the larger leaves with adpressed whitish setae, the setose ridges of the calyx and the green colour of the flower. The flowers of *C. foetens* are a lurid purplish-blue.

Cyananthus lichiangensis, W. W. Sm. Sp. nov.

Species ex affinitate *Cyananthi inflati*, Hook. f. et Thoms.; calyce patenti-fulvo-setoso, flore flavo inter alia differt.

Planta 15–30 cm. alta, annua. Caules e radice multi (10–15), supra sparse ramosi, flexuosi, decumbentes, glabri nisi ad apicem sparse albopilosam, basi subnudi foliis delapsis. Folia alterna 10–14 mm. longa, 8–10 mm. lata, subdeltoidea, apice rotundata, basi cuneata, in petiolum 2–4 mm. longum + sparse albo-pilosum angustata, integra, supra adpresse albo-pilosa, infra sparse et longiuscule. Flores terminales et in apice ramulorum lateralium; pedunculi 2–3 mm. longi. Calyx circ. 14 mm. longus, 8–9 mm. latus in sicco, late cylindricus, lobulis 5 ovatis, 4 mm. longis, apice rotundatis vel obtusis praeditus, extus setis fulvis patentibus e papillis nigris ortis densius indutus, intus vix sparsius. Corolla 2.5 cm. longa, 7–8 mm. lata, tubulosa, glabra, flava; lobi ovati 4 mm. longi, obtusi. Stamina 5 mm. longa. Fructus deest.

"Plant of 6–12 inches. Flowers light yellow. Moist situations amongst rhododendron scrub on the western flank of the Lichiang Range. Lat. 27° 25′ W. Alt. 12,000 ft. August 1910." G. Forrest. No. 6369.

CAPRIFOLIACEAE.

Lonicera chlamydophora, W. W. Sm. Sp. nov.

Species affinis *Lonicerae trichopodae*, Franch.; foliis angustioribus, floribus majoribus ebracteolatis, calyce diverso inter alia recedit.

Frutex 2.5–5 m. altus. Rami seniores robusti, lichenibus dense induti; juniores graciles lineis duabus pilosis percursi. Folia numerosa breviter (2–3 mm.) petiolata, oblanceolata, 2–2.5 cm. longa, 4–6 mm. sub apice lata, apice obtusa, basi cuneata, integra, supra sparse setoso-pilosula marginibus setoso-ciliatis, infra sparse fulvo-setosula, praesertim in venis, quarum axillae inferiores squamulis parvis flavidis setigeris instructae, supra viridia nervis obscuris, infra glaucescentia, nervis distinctis bene reticulatis purpurascentibus. Pedunculi 2–4-nati in apice ramulorum foliis paucis, bracteis multis squamiformibus imbricatis instructorum, circ. 1.5 cm. longi, arcuato-cernui, subrobusti magis quam filiformes, glabri vel glabrescentes, bracteis linearibus circ. 6 mm. longis, glabris, bracteolis nullis. Flores gemini; calyx carnosulus, pallide viridis, glaber, annulatus, vix 1 mm. longus, ovariis glabris ex toto connatis multo minor, margine undulato-lobatus. Corollae saturate aurantiaco-luteae tubus circ. 11 mm. longus 4–5 mm. latus, basi valde gibbosus extus glaber vel primo ad apicem sparse pilosulus, intus albo-pilosus; lobi circ. 2 mm. longi rotundati. Stamina alte inserta, vix inclusa, filamentis albo-pilosis parte libera glabra exceptâ. Stylus breviter exsertus dense longiuscule albo-pilosus .

"Shrub of 8–15 ft. Flowers deep golden yellow. In rhododendron forest on the eastern flank of the Lichiang Range. Lat. 27° 25′ N. Alt. 12,000–13,000 ft. June 1910." G. Forrest. No. 5744.

Allied to *Lonicera trichopoda*, Franch., but with very different flowers. The specific name is taken from the thick covering of lichens.

CARYOPHYLLEAE.

Arenaria lichiangensis, W. W. Sm. Sp. nov.

Species affinis *Arenariae kansuensi*, Maxim.; petalis angustis calycem multo superantibus inter alia differt.

Planta densissime pulvinata, glebam 10–15 cm. diametro efficiens subglabra. Caudex lignosus polycephalus, foliorum reliquiis marcidis densissime indutus. Cauliculi simplices; pars viridis brevissima ad 1.5 cm. longa, pars hypogaea emarcida 6–8 cm. longa, *Polytrichi* caulibus simillima. Folia basalia dense conferta, 10–13 mm. longa, circ. 1 mm. lata, linearia, pungentia, coriacea, glabra, margine albido-marginata et indurata; caulina 2, margine ciliata, basi translucentia. Pedicelli circ. 5 mm. longi, fulvo-pilosuli. Calyx basi rotundatus, vix incrassatus; sepala 3 mm. longa, 1 mm. lata, oblonga vel oblongo-ovata, obtusa, glabra, marginibus albo-marginatis minute ciliatis exceptis. Petala 5–6 mm. longa, lineari-spathulata, alba. Stamina 10 fere corollam aequantia. Ovarium obovoideum, nitens, stylis tribus, seminibus reniformibus compressis 12–20 praeditum.

"Plant of 1–4 inches. Flowers white. Forming dense cushions in the crevices of boulders and cliffs in moist situations on the western flank of the Lichiang Range. Lat. 27° 30′ N. Alt. 12,000–13,000 ft. July 1910." G. Forrest. No. 6103.

"Matted plant of 1–2 inches. Flowers white. Stony, alpine pasture on the eastern flank of the Lichiang Range. Lat. 27°

30′ N. Alt. 14,000–15,000 ft. August 1910." G. Forrest. No. 6379.

Another of the cushion Arenarias, which seem so prevalent in the higher mountains of India, Tibet, and China.

Arenaria roseotincta, W. W. Sm. Sp. nov.

Species ex affinitate *Arenariae ciliolatae,* Edgew. et *A. melandryoidis,* Edgew.; sepalis roseotinctis corollam aequantibus conspicua.

Planta perennis nana 1–2.5 cm. alta, caespitosa, multicaulis, basi squamulis stramineis induta. Caulis debilis stramineus, ad medium nudus, superne foliorum 3–4 paribus praeditus, flore solitario terminatus. Folia circ. 4 mm. longa, lanceolata, acuta, saepe mucronata, petiolo 1 mm. longo membranaceo instructa, glabra. Pedunculus circ. 5 mm. longus, flexilis, tomentellus. Sepala circ. 3 mm. longa, erecta, oblonga vel ovato-oblonga, obtusa vel subacuta, glabra vel basi sparse puberula, roseo-purpurea nisi costa lata viridis. Petala calycem aequantia, tenuissima, sepalis fere (in sicco) velata, anguste spathulata, rosea. Stamina 10 calycem fere aequantia. Styli 3. Fructus maturus deest.

"Plant of ½–1 inch. Flowers rose. Moist, peaty, alpine pasture on the western flank of the Lichiang Range. Lat. 27° 35′ N. Alt. 14,000–15,000 ft. August 1910." G. Forrest. No. 6360.

Silene rosiflora, F. K. Ward. Sp. nov.

Species habitu *S. cardiopetalae,* Franch. cui valde affinis est; magnitudine, foliis sessilibus, inflorescentia glandulosa, calyce diverso distinguitur.

Perennis, 15–30 cm. alta, ramosa. Caulis suberectus vel procumbens, dense pubescens; rami fere recto angulo abeuntes. Folia vix petiolata, ad 2.5 cm. longa, ad 1 cm. lata, lanceolata, basi parum attenuata, apice acuta, submucronulata, supra sparse puberula infra densius, margine ciliata. Inflorescentia terminalis 7–8 cm. longa, laxe dichotome cymoso-corymbosa ramis dense glanduloso-pubescentibus; bracteae lanceolatae vel lineares; pedicelli 2–4 cm. longi. Calyx fere 1.5 cm. longus, 6 mm. latus, tubulosus, basi subtruncatus, parum constrictus, viridis, lineis 10 eminentibus, saturate purpureis, dense glanduloso-pubescentibus pererratus, dentibus circ. 4 mm. longis, triangularibus, acutis, margine membranaceis. Corolla 2 cm. longa vel ultra, rosea; unguis glaber in auriculas latas dilatatus, ad faucem constrictus; lamina late obcordata, apice ad tertiam partem sinu angustissimo divisa, pulchre reticulata; squamae faucis oblongae, fere integrae. Stamina paulo exserta, filamentis glabris, antheris pallido-purpureis. Styli tres; ovarium oblongum carpophoro longius.

China :—N.W. Yunnan, near Atuntsi.

The description is based on plants grown from seed obtained by F. Kingdon Ward. These flowered in July 1912 at the nurseries of Bees Limited, Sealand, near Chester, and also in the Royal Botanic Garden, Edinburgh.

COMPOSITAE.

905 **Cremanthodium bupleurifolium,** W. W. Sm. Sp. nov.

Species affinis *Cremanthodio plantagineo*, Maxim. sed caule gracili glabriore, capitulo minore fere glabro, pappo deficiente, inter alia facile distinguenda.

Planta unicaulis, 18–35 cm. alta, basi fibris multis erectis circ. 4 cm. longis induta. Caulis suberectus flexuosus, debilis, striatus, inferne glaber, superne minute tomentosus, capitulo solitario terminatus. Folia radicalia 3–4, petiolata ad 2 cm., oblanceolata vel subelliptica, 2–5 cm. longa, circ. 1–5 cm. lata, apice subobtusa, basi cuneata, subintegra, chartacea, glabra penninervia ; folia caulina 2–3, eis *Bupleuri Candollii* similia, 4–5.5 cm. longa, circ. 1.5 cm. lata, oblonga, apice rotundata vel obtusa, basi angustata amplexicaulia, subintegra, glabra. Capitulum in sicco 3–4 cm. diametro, cernuum ; involucri phylla circ. 1 cm. longa, lanceolata vel ovato-lanceolata, acuta, glabra vel fere glabra, ligulae circ. 1.5 cm. longae, lineari-lanceolatae, 5-nerviae luteae ; achaenia immatura glabra ; pappus nullus.

" China :—N.W. Yunnan, at Atuntsi, at an elevation of 14,000–15,000 ft. in alpine grassland. July 1911." F. Kingdon Ward. No. 75.

1904 **Lactuca Forrestii,** W. W. Sm. Sp. nov.

Species *Lactucae grandiflorae*, Franch. affinis ; capitulis minoribus multo angustioribus, involucri phyllis valde diversis facile distinguenda.

Planta 30–75 cm. alta, erecta, robusta. Caulis 4–10 mm. diamet., infra simplex, in regione inflorescentiae ramosus, teres, in parte inferiore glaber, purpureo-maculatus et -striatus, superne pedunculique setoso-glandulosi. Folia radicalia petiolo ad 10 cm. longo valido praedita, 15–25 cm. longa, 5–10 cm. lata, runcinata, lobis grosse rotundatis indurato-dentatis, lobo terminali triangulari subacuto, glabra, subtus glaucescentia, nervis eminentibus ; folia caulina sessilia, ad 15 cm. longa, ad 5 cm. lata, runcinata, auriculis rotundatis dentatis amplexicaulia, supra sparsissime pilosula, infra glabra glaucescentia. Rami floriferi (praeter supremos) numerosi axillares, saepe foliis inferioribus orti, 3–6–cephali, praesertim ad apicem setoso-glandulosi; inflorescentia terminalis copiosa ramulis fere rectangulo abeuntibus, foliis reductis ovatis vel lanceolatis praedita. Capitula ovato-oblonga, 2 cm. longa vel ultra, basi 6–8 mm. lata, cernua, circ. 10–flora; involucri phylla 3–seriata, lineari-lanceolata, acuta vel acuminata, purpureo-viridia, setoso-carinata, exteriora subreflexa, circ. 1 cm. longa, interiora erecta, circ. 2 cm. longa, 3 mm. lata; ligulae coeruleae involucrum multo superantes, 5-dentatae, tubo extus glabro; ovarium oblongum, valde compressum, faciebus 3–5–costatum, glabrum, in rostrum albidum gracile attenuatum, pappo albido fragili praeditum.

"Plant of 1–2½ ft. Flowers blue. On rocks and ledges of cliffs on the eastern flank of the Lichiang Range. Lat. 27° 30′ N. Alt. 10,000 ft. September 1910." G. Forrest. No. 6703.

Also flowered in the Royal Botanic Garden, Edinburgh, in September 1912.

Lactuca funebris, W. W. Sm. Sp. nov.

Species e grege *Scariolarum*; foliis atroviridibus, capitulis saepe apice glomeratis more *Cardui palustris*, floribus albido-caeruleis vel albidis conspicua.

Herba 30–120 cm. alta, erecta, in schedâ simplex (sed culta a basi ad apicem ramis erectis ramosa) succo lacteo praedita, radicibus fasciculatis fusiformibus. Caulis robustus, .5–2 cm. diamet. vel ultra, subteres, basi glabrescens, medio sparse, apice dense rufo-tomentellus, purpureo-striatus atque -maculatus; ramuli similes, apice bene foliati. Folia infima et mediana subsimilia, alterna, crebra, petiolo 10–15 cm. longo, anguste alato, praedita; lamina 9–12 cm. longa, 7–9 cm. lata, ambitu irregulariter et late triangularia, varie 3–5–loba vel -fida, lobis oblongis serratis, serraturis apiculatis, supra atro-viridia, nigro-pilosula, nervis immersis, infra pallidiora, sparsius pilosula vel subglabra, nervis eminentibus; folia superiora minus divisa, saepe fere integra, obovata vel oblanceolata, vel lanceolata vel lineari-lanceolata, acuta vel acuminata. Inflorescentiae numerosae caulem et ramulos terminantes et cymas breves axillares formantes; capitula 5–20–aggregata, pedunculis brevissimis rufo-pilosulis praedita, circ. 1.5 cm. longa, circ. 7 mm. lata, 20–30–flora; involucri cylindrici phyla exteriora lanceolata, 5–8 mm. longa, carinâ albo-setosulâ praedita, interiora lineari-lanceolata, 1 cm. longa vel ultra, subglabra, omnia arcte imbricata; receptaculum planum nudum. Corolla circ. 5 mm. exserta, sordide albida vel pallido-caerulea. Ovarum ovoideum, compressum, glabrum, apice in rostrum breve productum, pappo albo praeditum.

"Plant of 1–2 ft. Flowers pale blue. Ledges of cliffs and humus covered boulders on the eastern flank of the Lichiang

Range. Lat. 27° 30′ N. Alt. 11,000–12,000 ft. September 1910." G. Forrest. No. 6677.

The plant was cultivated in the Royal Botanic Garden, Edinburgh, in the cold, wet season of 1912. It grew to a height of 4 ft., branched freely from base to top with strict erect branches, while the inflorescences remained compacted and were slow to flower. The colour of the corolla was whitish at first, but the bloom was imperfectly developed; later, bluish heads were observed. In the wild plant the collector notes that the flowers were pale blue.

14902 **Saussurea loriformis,** W. W. Sm. Sp. nov.

Species affinis *S. subulatae*, C. B. Clarke et *S. Hookeri*, C. B. Clarke; foliis loriformibus, bracteis dense et longe albo-tomentosis, inter alia distincta.

Planta nana caespitosa, facie *S. subulatae*, stolonifera, multiceps; radix crassa, superne (cum caule inferiore) foliorum pristinorum vaginis siccis nigrescentibus dense obtecta. Caulis brevissimus, 1–3 cm. longus, foliis bracteisque velatus et capitulo solitario terminatus; e caudice multicipite plerumque oriuntur caulis unus capitulifer, ceteri (5–6) steriles. Folia omnia radicalia, rosulata, circ. 4–8–fasciculata, suberecta (saltem primo), linearia, 3–4 cm. longa, 2–3 mm. lata, apice obtusa vel rotundata, basin versus angustata in vaginam brevem purpurascentem tomento denso albo celatam, integra, supra dense fulvo-tomentosa, infra dense et longe albo-tomentosa. Capitulum 2–2.5 cm. diametiens, involucri phylla 1–1.5 cm. longa, lineari–lanceolata, apice caudato-acuminata, basi dilatata, extus dense albo-tomentosa, intus (nisi apice ipso albo-tomentosissimo) glaberrima viridia. Receptaculi setae numerosae, circ. 5 mm. longae. Corolla (purpurea?) circ. 12 mm. longa; tubi pars infera angustissma 6–7 mm. longa, supera circ. 3 mm. longa; limbi segmenta circ. 3 mm. longa. Pappi series exterior setulis 2–3 mm. longis composita; seriei interioris pili basi paulo coaliti plumosi circ. 10 mm. longi. Achaenium immaturum, 2 mm. longum.

" N.W. Yunnan, China:—At Pei-ma-shan, on screes at an altitude of 17,000 ft. July 1911." F. Kingdon Ward. No. 74.

The Saussureas of the Himalayan-Chinese Mountain-systems seem endless in their number and variety. The present species recalls *Saussurea subulata*, but differs widely in the leaves and bracts from the Himalayan plant. Saussureas are about the last survivors of the phanerogams as the limit of vegetation is approached in these regions, and the appearance of *S. loriformis* is quite in keeping with its habitat on the screes as 17,000 ft.

Saussurea quercifolia, W. W. Sm. Sp. nov.

Species in grege "*Acaulis,*" C. B. Clarke ponenda, ex affinitate *S. subulatae,* C. B. Clarke ; foliorum forma, capitulis aggregatis, pappo atrofusco conspicua.

Planta nana caespitosa rhizomate praelongo (ad 30 cm.), repenti foliorum delapsorum vaginis nigrescentibus dense obsito. Caulis brevis circ. 4 cm. longus, hinc inde albo-flocculoso-tomentosus, capitulis 4–5 dense aggregatis terminatus. Folia fere omnia radicalia, ad 1 cm. petiolata, 3–4 cm. longa, 1–1.25 cm. lata, elliptica vel anguste obovata, apice subobtusa, basi cuneata, grosse serrato-dentata, supra rugosula, sparse albo-tomentosa, pallide viridia, infra dense minute albo-tomentosa. Capitula dense conferta, fere sessilia, basi albo-tomentosa ; involucri phylla obovata, circ. 3 cm. longa, albo- vel rufo-tomentosa ; corolla circ. 1.5 cm. longa, coerulea ; pappus circ. 1 cm. longus, plumosus, atrofuscus ; achenia vix matura, anguste obovata, circ. 2 mm. longa, fusca, glabra.

"China :—N.W. Yunnan, at Atuntsi, scree plant at an altitude of 14,000 ft. September 1911." F. Kingdon Ward. No. 73.

1900 **Senecio cymbulifer,** W. W. Sm. Sp. nov.

Species sectionis Ligulariae, affinis *Senecioni lapathifolio,* Franch. et *Senecioni stenoglosso,* Franch. ; ab hoc foliis distinguitur ; ab illo floribus minoribus, ligulis diversis recedit.

Planta 60–120 cm. alta, erecta robusta. Caulis 1 cm. vel ultra diametro, striatus, albo-araneosus. Folia basilaria 1–2, ampla, ad 35 cm. longa, ad 25 cm. lata, elliptica vel obovato-elliptica, brevipetiolata, vaginâ magnâ praedita, basi vix cordata, apice rotundata circumcirca multidentata, dentibus parvis incrassatis, sparsius utraque facie albo-araneosa, chartacea ; caulina pauca, 2–3, omnia vaginâ permagnâ cymbiformi praedita, petiolo deficiente ; supremum saepius ad vaginam reductum ; vaginarum albo-araneosarum orae denticulis glandulosis saepe instructae. Inflorescentia ampla, paniculata, 10–15 cm. diametro ; paniculae ramuli nunc contracti, inflorescentiam densam formantes, nunc praelongi, inflorescentiam diffusiorem praebentes, albo- vel fulvo-araneosi ; bracteae lineares ; capitula brevius vel longius pedunculata, mediocria. Involucri phylla 8–10, ovato-lanceolata vel lanceolata, acuta vel obtusa, 7–8 mm. longa, margine nigrescentia, extus puberula vel subglabra. Flores ligulati, 5–6, flavi, circ. 12–13 mm. longi ; flores tubulosi circ. 12, flavi ; pappus albidus fragilis 6 mm. longus ; achaenium immaturum 1 mm. longum.

" Plant of 2–4 ft. Ray and disc florets similar, yellow. Open mountain meadows on the eastern flank of the Lichiang

Range. Lat. 27° 30′ N. Alt. 11,000–12,000 ft. July 1910." G. Forrest. No. 6236.

" Plant of 2–3 ft. Ray and disc florets orange. Mountain meadows on the eastern flank of the Lichiang Range. Lat. 27° 30′ N. Alt. 11,000–12,000 ft. August 1910." G. Forrest. No. 6451.

" Plant of 2–3½ ft. Ray and disc florets bright orange. Open mountain meadows on the eastern flank of the Lichiang Range. Lat. 27° 30′ N. Alt. 12,000 ft. August 1910." G. Forrest. No. 6485.

This number I take to be the same as the two preceding ; the inflorescence is much more diffuse as one would expect in a specimen collected later in the season.

Senecio latihastatus, W. W. Sm. Sp. nov.

Species e grege Ligularia, ex affinitate *Senecionis cacaliaefolii*, Sch. Bip. et forsan varietas illius speciei polymorphae ; interim melius pro specie propria militat ; foliis latihastatis, floribus magnis conspicua.

Planta 45–60 cm. alta, robusta. Caulis striatus, superne fulvo- et albo-araneoso-tomentosa, inferne glabrescens, basi fibris rigidis erectis ad collum radicale indutus. Folia radicalia circ. 6, longe (ad 16 cm.) petiolata, 7–9 cm. longa, ad 14 cm. lata, triangulari-hastata, margine dentata, chartacea, glabra ; caulina minora, 2, vaginâ magna amplexicauli praedita, petiolo brevi vel deficiente. Capitula circ. 10, magna, racemose disposita, erecta, basi fere 1 cm. lata. Involucri phylla circ. 10, vix libera, 8–9 mm. longa, lineari-oblonga, acuta vel breviter acuminata, extus minute araneoso-puberula ; corolla 3 cm. longa vel ultra, saturate aurantiaca ; pappus 6 mm. longus, sordide albus ; achaenium immaturum anguste oblongum 2.5 mm. longum.

" Plant of 18–24 inches. Flowers deep orange, fragrant. Moist situations on mountain meadows on the eastern flank of the Lichiang Range. Lat. 27° 30′ N. Alt. 12,000 ft. August 1910." G. Forrest. No. 6409.

The plant resembles in habit *Senecio Sagitta*, Maxim, from Western Kansu.

Senecio orotrephes, W. W. Sm. Sp. nov.

Species ob capitula racemosa discoidea affinis *Senecioni subspicato*, Bur. et Franch., a quo habitu robusto, pedunculis longioribus, involucri phyllis diversis inter alia recedit.

Planta 40–50 cm. alta, erecta, robusta. Caulis subteres, striatulus, 4–5 mm. diametro, subnudus, basi ad apicem dense capillis nigris patentibus indutus, racemo 3–8-floro terminatus. Folia radicalia 1–2, vaginâ 3–4 cm. longâ extus nigro-tomentosa et petiolo 4–8 cm. longo dense nigro-tomentoso praedita, 5–10 cm. longa, 5–9 cm. lata, subreniformia, apice rotundata, basi alte cordata, margine indurato-dentata, subcoriacea, supra viridia glabra nervis obscuris, infra pallidiora, in venis distinctioribus sparsius nigro-tomentosa ; folium caulinum solitarium, medio vel infra insertum, vagina 4–6 cm. longa praeditum, petiolo deficiente ; lamina nunc ovata, 3 cm. longa, 3 cm. lata, nunc minor, vix ab vaginâ discreta. Scapus ad apicem bractea 1 cm. longa vel ultra, lineari instructus, ceterum nudus ; pedunculi 1–3 cm. longi, dense nigro-villosuli, bracteis linearibus nigris praediti. Capitula 3–8 cernua, in sicco 1.5 cm. diametro, discoidea ; involucri phylla circ. 8, medio in tubum latum extus nigro-villosulum circ. 6 mm. longum, circ. 8 mm. latum connata ; partes liberae 6 mm. longae, lanceolatae, nigro-villosulae, intus glabrae. Corolla saturate aurantiaca, circ. 8 mm. longa ; pappus pallide rufus, 6–7 mm. longus ; achaenium (immaturum) 3 mm. longum, oblongum.

" Plant of 16–20 inches. Flowers deep orange. Stony pasture on the eastern flank of the Lichiang Range. Lat. 27° 35′ N. Alt. 12,000 ft. September 1910." G. Forrest. No. 6548.

Senecio pteropodus, W. W. Sm. Sp. nov.

Species habitu affinis *Senecioni Faberi,* Hemsl. ; foliis medianis deltoideis, petiolis late alatis, capitulis discoideis differt.

Planta 60–75 cm. alta, erecta, unicaulis. Caulis striatus flexuosus, basi mox defoliatus infra glaber, supra et in ramulis inflorescentiae fulvo-tomentosus. Folia basalia delapsa ; caulina inferiora 3–4, cum petiolo 12 cm. longa, 5–6 cm. lata ; petiolus 6 cm. longus, basi amplexicaulis, ad 10–13 mm. alatus ; lamina deltoidea, 6 cm. longa, grosse acute dentata ; folia superiora 3–4, minora, amplexicaulia, sessilia, oblonga, ad 9 cm. longa, circ. 3 cm. lata, acuminata acute dentata. Inflorescentia corymboso-paniculata, mediocris, capitulis approximatis parvis vix 1 cm. longis, bracteis linearibus. Involucri phylla circ. 10, linearia vel lineari-lanceolata, 6–8 mm. longa, apice nigrescentia, basi villosula, cetera glabra. Flores ligulati, 0 ; tubulosi, 20–30 ; saturate lutei, 6–8 mm. longi ; pappus albidus fragilis, 5–6 mm. longus ; achaenium vix 1 mm. longum.

" Plant of 2–2½ ft. Flowers deep lemon yellow. Margin of pine forests on the eastern flank of the Tali Range. Lat. 25° 40′ N. Alt. 10,000 ft. August 1910." G. Forrest. No. 6981.

Senecio remipes, W. W. Sm. Sp. nov.

Species affinis *Senecioni liatroides,* C. Winkl. ; foliis late obovatis, inflorescentiâ angustâ strictâ parviflorâ conspicua.

Planta 75–120 cm. alta, robusta, erecta. Caulis striatus, superne plus minusve fulvo-tomentosus, medio inferneque subglaber, basi fibris rigidis erectis ad collum radicale circumdatus. Folium basale vix petiolatum, in vaginam brevem amplexicaulem contractum, circ. 16 cm. longum, 10 cm. latum, late obovatum, apice breviter acuminatum, margine dentibus incrassatis denticulatum, coriaceum, undique glabrum, nervis supra subobscuris, infra bene reticulatis ; folia caulina 2–3, minora, cetera subsimilia folio radicali. Scapus sub inflorescentiâ ad 12 cm. subnudus, bracteis paucis 2–4 cm. longis linearibus instructus ; racemus simplex 20 cm. longus vel ultra ; capitula 30–50, infra subremota, supra densiora, 10–12 mm. longa, circ. 5 mm. lata, nutantia ; pedunculi 5–10 mm. longi, fulvo-tomentosi, bracteolis 1–2, linearibus, 1–2 cm. longis, nigro-(glanduloso ?)-capitatis instructi. Involucri phylla 4–5, lineari-oblonga, circ. 6 mm. longa, extus puberula vel subglabra, pallide marginata, apice nigrescentia ; ligulae 3–4, aurantiacae, 6–8 mm. longae ; disci flores circ. 12 ; corolla circ. 6 mm. longa ; pappus albus fragilis 4 mm. longus ; achaenium 4 mm. longum.

" Plant of 2½–4 ft. Ray florets orange, disc florets darker. Alpine pasture on the eastern flank of the Lichiang Range. Lat. 27° 30′ N. Alt. 13,000 ft. August 1910." G. Forrest. No. 6493.

Characterised among the allied species by the broad obovate leaves resembling the blade of a paddle and by the relatively small flowers.

44895 **Senecio sciatrephes,** W. W. Sm. Sp. nov.

Species affinis *Senecioni cymatocrepidi,* Diels sed foliis remote indurato-dentatis, involucro glabro recedit.

Planta 15–75 cm. alta, erecta. Caulis striatus, basi longe defoliatus et nudus, infra sparsius, supra densius tomento albo detersili indutus. Folia 5–6 in medio caule plerumque aggregata, itaque nunc alterna, nunc subopposita, in petiolum 4–6 cm. longum, complanatum, subalatum sparse flocculoso-tomentosum leniter angustata, 12–16 cm. longa, 4–6 cm. lata, lanceolata vel ovato-lanceolata, apice subacuminata, basi cuneata, margine remote indurato-dentata, supra viridia sparse minute pilosula vel glabrescentia, venis obscuris, infra pallidiora, tomento minuto griseo detersili praedita, nervis 5–6 paribus distinctis. Inflorescentia paniculata ; ramuli paniculae corymbis 5–8-floris terminati ; corymbi 2–12 ; capitula subsessilia vel ad 1 cm. pedunculata ; bracteolae lineares circ. 1 cm. longae, cum pedunculis flocculoso-tomentosae. Involucri tubuloso-cylindrici 6 mm. longi phylla 5 viridia oblongo-linearia, apice subobtusa, glabra, margine pellucida. Flores ligulati nulli ; tubulosi 4–5 aurantiaco-flavi, circ. 1 cm. longi; pappus albus, 5–6 mm. longus, fragilis; achaenia immatura linearia 2 mm. longa.

"Plant of 1–2½ ft. Flowers orange yellow. Shady situations in pine forests on the eastern flank of the Tali Range. Lat. 25° 40′ N. Alt. 8000–9000 ft. July 1910." G. Forrest. No. 6811.

"Plant of 6–12 inches. Flowers deep dull orange. Shady situations in pine and mixed forests on the eastern flank of the Tali Range. Lat. 25° 40′ N. Alt. 10,000–11,000 ft. September 1910." G. Forrest. No. 6911.

Tanacetum quercifolium, W. W. Sm. Sp. nov.

Species distinctissima; habitu, foliis formâ eis *Querci Roburis* subsimilibus, inflorescentiâ amplâ conspicua.

Planta basi suffrutescens, 60–120 cm. alta, basi et in regione inflorescentiae ramosa, bene foliata. Caules 2–10 e basi orti, robusti, erecti, striatuli, cinereo-adpresso-tomentulosi. Folia alterna, numerosa, inferiora et media similia, superiora minora tandem integra et bracteiformia; inferiora 10–15 cm. longa, 4–5 cm. lata, obovato-oblonga, irregulariter 5–9–dentato-sinuata vel lobatula, lobulis circ. 1 cm. longis triangularibus apiculatis, supra viridia, nervis utrinque circ. 6, immersis, infra dense minute cinereo-tomentella, nervis multum prominentibus. Inflorescentia ampla, 20 cm. longa vel ultra, ramosissima, paniculato-corymbosa; prope basin corymborum ultimorum folia numerosa supposita, bracteiformia, 1–3 cm. longa, lanceolata, integra, subtus cinereo-tomentella, 5–10 capitula amplectantia; pedunculi ultimi 2–3 mm. longi; involucri campanulati phyla exteriora lanceolata, viridia, basi lateribusque cinereo-tomentellosa, interiora late oblonga, scariosa. Capitula ± 20-flora, circ. 4 mm. longa, circ. 3 mm. lata, homogama. Corolla flava, vix. 3 mm. longa, nitenti-glandulosa.

"Shrub of 2–4 ft. Flowers brassy yellow. Shady situations in pine forests on the eastern flank of the Lichiang Range. Lat. 27° 25′ N. Alt. 11,000–12,000 ft. September 1910." G. Forrest. No. 6671.

Also in cultivation in the Royal Botanic Garden, Edinburgh, and flowering September 1912.

CRUCIFERAE.

Braya Forrestii, W. W. Sm. Sp. nov.

Species affinis *Brayae aeneae*, Bunge sed habitu, foliis linearibus, scapo breviore piloso, floribus majoribus differt; a *B. tibetica*, H. f. et T. floribus majoribus, sepalis glabris recedit.

Planta perennis, dense caespitosa, radice crassissimâ multicipiti praedita. Scapi 3–5 cm. longi, basi foliis hornotinis multis et vaginis pristinorum marcidis dense obsiti, superne nudi, plus minusve dense pilis albis patentibus praediti, racemo 5–9–floro terminati. Folia omnia radicalia linearia, 2–3 cm. longa, 1 mm. lata, subobtusa, integra, glabra. Racemus brevis, circ. 1 cm. longus, subcorymbosus, pedicellis circ. 2 mm. longis albo-patenti-villosis. Sepala 3 mm. longa, vix 2 mm. lata, elliptica, distincte albo-marginata, viridia, apice purpuratta glabra. Petala calycem fere duplo excedentia, obovata, alba, Siliqua (immatura) oblonga, compressiuscula, stylo circ. 1 mm, longo, seminibus paucis (circ. 4).

"Tufted plant of 1–3 inches. Flowers white. Crevices of limestone cliffs on the western flank of the Lichiang Range. Lat. 27° 20′ N. Alt. 12,000–13,000 ft. June 1910." G. Forrest. No. 5749.

Cardamine ? verticillata, Jeffrey et W. W. Sm. Sp. nov.

Species habitu *C. Franchetianae,* Diels (= *Loxostemon Delavayi,* Franch.) et *C. granuliferae* (Franch.) Diels sed foliis integris verticillatis facile distinguenda; fructu ignoto et inflorescentiâ bracteis praeditâ, in genere *Cardamine* dubie posita.

Planta circ. 10 cm. alta gracilis. Radix, in locis saxosis errans, praelonga, ad 10 cm. longa vel ultra, flagelliformis, ad collum folia pauca 2–4 mm. longa squamiformia gerens; bulbilli, ut videtur, desunt. Caulis solitarius (rarius duo) simplex, tenuis, glaber, nisi ad apicem foliis nudus. Folia 4–8–verticillata, circ. 1–2 cm. sub inflorescentia posita, petiolo 10–12 mm. longo praedita, spathulata, 5–8 mm. longa, 3–4 mm. lata, apice rotundata, basi in petiolum attenuata, integerrima, glabra carnosula venis indistinctis, subtus rugosula. Inflorescentiae 1–3 ex axillis foliorum verticillatorum ortae, 1–2 cm. longae, corymbosae, densiores; bracteae foliis subsimiles sed minores; pedunculus pilis albidis deflexis sparse praeditus; pedicelli ad 5 mm. longi glabri. Sepala 2–2.5 mm. longa, ovata vel ovato-oblonga, obtusa, margine translucente. Petala 5–6 mm. longa, obovata, ungue angustâ, alba. Filamenta circ. 3 mm. longa, antherae in sicco nigrae. Ovarium immaturum obovoideum circ. 2 mm. longum.

"China :—N.W. Yunnan, near Atuntsi, at an altitude of 15,000 ft. July 1911." F. Kingdon Ward. No. 17.

A peculiar plant recalling the Cardamines of the section Dentaria and placed provisionally in Cardamine. The whorled leaves and the bracts are against its inclusion in that genus, but in the absence of fruit the affinity is doubtful.

Draba alpina, Linn., var. **involucrata,** W. W. Sm. Var. nov.

Dense caespitosa; caules permulti arcte intertexti; folia sub anthesin rosulatim conferta, quasi involucrum formantia; pedunculus brevissimus; flores subcapitati.

Differs much in habit from typical *Draba alpina,* Linn. The older portions of the stems, almost hypogeal, form a dense weft, in extreme cases like a mass of *Polytrichum.* At the summit of this are the numerous short shoots of the year usually only 1 cm. high, the leaves rosulate and forming almost an involucre round the contracted inflorescence.

"Tufted plant of 1–3 inches. Flowers bright golden yellow. Crevices and ledges of moist limestone cliffs on the eastern flank of the Lichiang Range. Lat. 27° 25′ N. Alt. 11,000–12,000 ft. June 1910." G. Forrest. No. 5732.

"Matted plant of 1 inch. Flowers golden yellow. On boulders and limestone drift on the eastern flank of the Lichiang Range. Lat. 27° 40′ N. Alt. 15,000–16,000 ft. July 1910." G. Forrest. No. 6138.

Also grown from seed in the Royal Botanic Garden, Edinburgh, where it flowered in the beginning of April 1912.

Megacarpaea Delavayi, Franch., var. **minor.** W. W. Sm. Var. nov.

Planta minor, foliolis angustissimis, floribus saturate roseis praedita.

"Plant of 6–24 inches. Flowers deep rose, fragrant. Open alpine meadows on the western flank of the Lichiang Range. Lat. 27° 20′ N. Alt. 11,000 ft. July 1910." G. Forrest. No. 6021.

GENTIANEAE.

Gentiana atuntsiensis, W. W. Sm. Sp. nov.

Ex affinitate *Gentianae microdontae,* Franch. sed habitu nano, foliis angustioribus, floribus subcapitatis inter alia recedit.

Planta erecta vel subdecumbens, 7–12 cm. alta, e rhizomate crasso ad collum haud filamentoso radicibus fibrosis multis praedito orta, caules steriles plures, florentem unum gignens. Caulis 5–8 cm. longus sparse foliatus, subangulatus, glaber, rubescens. Folia basalia pauca, laxius rosulata, 3–4 cm. longa, 4–8 mm. lata, lineari-lanceolata vel oblanceolata, apice obtusa, vix vel breviter petiolata, carnosula; caulina 1–3-paria, basalibus subsimilia, minora. Flores 3–5, subcapitati, ad axillas foliorum superiorum orientes, speciosi; pedicelli subnulli. Calycis tubus 1 cm. longus vel ultra, anguste obovoideus membranaceus ore truncatus; lobi inaequales, lineari-lanceolati, 3–5 mm. longi.

Corolla 3–3.5 cm. longa, in sicco ad 1.5 cm. lata, tubulosa, azurea, extus maculata; lobi circ. 5 mm. longi, ovati, plicas asymmetricas 3–4-plo superantes. Antherae circ. 4 mm. longae, liberae; filamenta haud alata. Ovarium sub anthesin circ. 1.5 cm. longum, circ. 1.5 cm. stipitatum, stylo brevi. Semina (immatura) testâ lamelloso-rugosâ praedita lamellis albis areolas hexagonas formantibus.

"China:—Near Atuntsi, on the borders of Yunnan and Tibet, at an elevation of 14,000–16,000 ft. September 1911." F. Kingdon Ward. No. 108.

Gentiana Wardii, W. W. Sm. Sp. nov.

Species habitu *Gentianae phyllocalycis*, Clarke; in eadem sectione *Frigida*, Kusnezow ponenda; flore maximo pro magnitudine plantae foliorumque inter species sectionis conspicua.

Planta nana rhizomate repenti gracillimo praedita. Caulis simplex, basi subdecumbens, deinde erectus, ± 1 cm. longus, foliis fere velatus. Folia rosulatim conferta, caulem et calycis tubum velantia, 4–5 mm. longa, circ. 4 mm. lata, late obovata vel late spathulata, apice rotundata, basi in petiolum latum brevissimum angustata, in sicco translucentia, subnitentia. Calyx vix 1 cm. longus, ad tertiam partem divisus in lobos 5, alios lanceolatos acutos, alios (rarius) obovatos, foliis similes. Corolla 2–2.2 cm. longa, in sicco circ. 8 mm. lata, dense coerulea, medio paululum ampliata, in lobos 3 mm. longos ovatos obtusos cum tubo continuos divisa; plicae asymmetricae, vix 1 mm. longae. Antherae liberae inclusae. Ovarium immaturum, longe stipitatum, stigmatibus linearibus revolutis coronatum; testa lamellosa, lamellis areolas hexagonas formantibus.

"China:—Near Atuntsi, on the borders of Yunnan and Tibet, at an elevation of 14,000–16,000 ft. September 1911." F. Kingdon Ward. No. 103.

A beautiful dwarf species with the flowers exceeding in size the short stem and leaves together.

LABIATAE.

Nepeta complanata, Dunn. Sp. nov.

Rhizoma crassum, ramosissimum, ramis late vagantibus caules foliosos florentesque solitarios emittentibus. Caules prostrati, subglabri, 9–14 cm. longi. Folia approximata, arcte imbricata, ex origine decussata, mox complanata, rotundata, apice obtusa, basi cordata, in petiolum brevissimum contracta, crenata, 1–3 cm. longa, papyracea, basi membranacea, albescentia, utrinque primo dense pubescentia, subtus glandulosa, tandem glabrescentia, venis supra impressis, infra prominentibus. Flores in verticillastris brevibus paucifloris axillaribus sub tecto complanato foliorum juxta humum enati, bracteis parvis foliaceis et bracteolis linearibus suffulti, 1.8–2.0 cm. longi. Calyx tubulosus, oblique 5–dentatus, 1 cm. longus, membranaceus, extus sparse, intus dense hirsutus, 15–nervius, dentibus aequalibus, 2–3 mm. longis, ovatis obtusis. Corolla tubulosa, 1.6–1.8 cm. longa, 5–lobata, extus sparse puberula, intus glabra, pallide purpurea, labio maculato, lobis 4, superioribus ovatis obtusis, 4 mm. longis, inferiore bis longiore emarginato. Staminum 2 superiora exserta, 2 inferiora inferius inserta, inclusa. Stylus longe exsertus. Nuculi non maturi.

"China :—N.W. Yunnan, scree plant, 16,000 ft. July 1911. The leaves twist so that they all appear to develop on one side (the upper) and overlap a great deal. The flowers lie under them next to the ground (protected from radiation)." F. Kingdon Ward. No. 138.

It has exactly the general habit of *Nepeta decolorans*, Hemsl., discovered by Littledale in the same region in 1895 and figured in Hooker's Icones Plantarum, t. 2470 ; its calyx, however, is very different, being equally cleft into 5 lobes, not bilabiate.

LEGUMINOSAE.

Astragalus Balfourianus, N. D. Simpson. Sp. nov.

Species ab *A. camptodonto*, Franch. et *A. tangutico*, Batalin pilis nigris albisque brevibus immixtis, foliolis supra glabris, bracteolis longioribus, calycis dentibus erectis, alis margine integris, ovario nigro-hirsuto distinguenda.

Herba perennis, rhizomate conspicue ramoso crasso, multicaulis, caulibus decumbentibus pilis nigris albisque brevissimis basifixis parce vestitis. Folia breviter petiolata, ad 3 cm. longa, imparipinnata, 6–10–juga ; foliola oblonga, apice retusa vel mucronulata, distincte petiolulata ad 10 mm. longa et 5 mm. lata, glabrescentia, supra glabra, subtus pilis albis paucis adpressis vestita ; stipulae triangulares, saepe reflexae, ad 4 mm. longae. Racemi 4–7–flori, pedunculis ad 3.5 cm. longis folia excedentibus ; bracteae lanceolatae, 5 mm. longae ; bracteolae 2, ad 4 mm. longae, rarissime calycis tubum aequantes ; pedicelli graciles, circiter 4 mm. longi. Calyx campanulatus 4–5 mm. longus, pilis adpressis nigris vel nigris albisque vestitus, dentibus erectis vel apice parum recurvatis linearibus saepissime involutis ad 6 mm. longis ut tubo pilis brevibus dense instructis. Corolla calycem multo excedens, sicco purpurea ; vexillum orbiculare, bilobum, 14–15 mm.

longum, 11–12 mm. latum, in unguem 4 mm. longum abrupte contractum ; alae 12–14 mm. longae, 4–4.5 mm. latae, lamina apice integra obtusa basi obtuse auriculata ; unguis ad 4.5 mm. longus ; carina ad 16 mm. longa, 5.5 mm. lata, apice obtusa, ungui 5–6 mm. longo. Ovarium breviter stipitatum, nigro-hirsutum, circiter 20–ovulatum ; stigma conspicue barbatum.

"Plant of 8–10 inches, flowers purple. Mountain pastures on the eastern flank of the Lichiang Range. Lat. 27° 30′ N. Alt. 20,000 ft. September 1910. N.W. Yunnan." G. Forrest. No. 6606 (Type).

"Plant of 8–10 inches. Flowers purple. Open stony pastures on the eastern flank of the Lichiang Range. Lat. 27° 30′ N. Alt. 12,000–13,000 ft. August 1910." G. Forrest. No. 6514.

"Plant of 9–15 inches. Flowers bright blue. Grassy slopes at the base of cliffs on the eastern flank of the Lichiang Range. Lat. 27° 20′ N. Alt. 10,000–12,000 ft. July 1906." G. Forrest. No. 2745.

Astragalus Forrestii, N. D. Simpson. Sp. nov.

Species *A. florido*, Benth ex Bunge, habitu persimilis sed racemis densissime multifloris, floribus bibracteolatis, calycis dentibus inaequalibus, ovario sessili facile distinguenda.

Herba robusa, rhizomate crasso ramoso ; caules circiter 45–60 cm. alti (ex *Forrest*), canaliculati, rigidi, pilis albis nigrisque basifixis dense vestiti, juveniles indumento densissimo instructi. Folia ad 14 cm. longa, imparipinnata, ad 19–juga, petiolo circa 1 cm. longo suffulta ; rhachis pilis nigris dense vestita ; foliola late linearia, acuta, breviter petiolulata, ad 20 mm. longa et 7 mm. lata, supra glabra, subtus margineque pilis albis vestita, costis petiolulisque pilis nigris albisque dense instructis ; stipulae liberae, membranaceae, ovatae, acuminatae, pilis longis albis nigrisque vestitae. Racemi terminales, multiflori floribus compactis ; bracteae membranaceae, ascendentes, ad 10 mm. longae ; bracteolae duae, 3 mm. longae, pedicellis pilis nigris dense vestitis. Calyx campanulatus, circa 5 mm. longus, lutescens, pilis paucis nigris vestitus, dentibus inaequalibus inferioribus 2.5 mm. longis superioribus 1 mm. longis, pilis nigris dense instructis. Corolla calyce duplo longior ; vexillum obovatum, emarginatum, 10.5 mm. longum, 5.5 mm. latum, glabrum, alas paullo superans ; alae 9 mm. longae, 2 mm. latae, lamina anguste oblonga apice margine integro basi obtuse auriculata, ungui 4.5 cm. longo ; carina 8.5 mm. longa, 2 mm. lata, apice obtusa. Ovarium sessile glabrum, semi-biloculare, 4–ovulatum ; stigma nudum.

"Plant 1½ to 2 ft. Flowers pale lemon yellow. Alpine pastures, on the western flank of the Lichiang Range. Lat. 27° 25′ N. Alt. 11,000 ft. June 1910. Yunnan." G. Forrest. No. 6041.

Astragalus lichiangensis, N. D. Simpson. Sp. nov.

Species ab *A. dolichochaete,* Diels, calycis dentibus brevioribus, vexillo in unguem sensim attenuato alas carinamque superante, ovario stipitato glabro distinguenda.

Herba perennis, rhizomate crasso ramoso, multicaulis, caulibus pilis nigris brevissimis basifixis parce vestitis. Folia ad 4 cm. (petiolis ad 1 cm. longis inclusis) longa, imparipinnata, 4–8-juga; foliola breviter petiolulata, ovato-oblonga vel obovata, basi cuneata, apice acuta vel obtusa, saepe mucronulata, circa 7 mm. longa et 3 mm. lata, supra glabra, subtus pilis albis parce vestita, margine minute ciliata; stipulae lanceolatae, acuminatae, 5 mm. longae. Racemi 4-6-flori, pedunculis foliis paulo longioribus; bracteae reflexae, lanceolatae, 5 mm. longae, pedicellos et calycis tubum aequantes; bracteolae 2, calycem subtendentes, 3.5–4 mm. longae, tubum subaequantes. Calyx campanulatus, 4 mm. longus, pilis nigris brevissimis vestitus, dentibus subulatis 5.5 mm. longis pilis nigris adpressis dense obtectis. Corolla calycem multo excedens; vexillum suborbiculare, emarginatum, 17 mm. longum, 13 mm. latum, in unguem brevem sensim attenuatum, alas carinamque superans; alae lamina apice obtusa, 13 mm. longa, 4.5 mm. lata, auricula parva obtusa, ungui 4 mm. longo; carina 13 mm. longa, 5 mm. lata, apice obtusa. Ovarium stipitatum, glabrum, 16-ovulatum; stigma pilis longis cinctum.

"Plant of 10–12 inches; flowers greenish yellow. Dry, open situations amongst pine scrub on the eastern flank of the Lichiang Range. Lat. 27° 25′ N. June 1910." G. Forrest. No. 5920.

Astragalus pullus, N. D. Simpson. Sp. nov.

Species ab *A. nigrescente,* Franch. ovario glabro stipitato, calycis dentibus tubum aequantibus, stipulis maioribus recedit.

Herba perennis, multicaulis, caulibus erectis 30–60 cm. altis (ex *Forrest*), pilis nigris brevibus parce vestitis. Folia ad 10 cm. (petiolis ad 2 cm. longis inclusis) longa, imparipinnata, 9–11-juga; foliola opposita, laxe disposita, breviter petiolulata, elliptico-oblonga, apice obtusa, saepe fere retusa, ad 12 mm. longa, 5 mm. lata, supra glabra, subtus pilis albis parce pilosa; stipulae caulinares, liberae, late lanceolatae, acutae, herbaceae, subtus pilis paucis nigris instructae. Racemi capitati, circa 12-flori; pedunculi ad 14 cm. longi, folia excedentes, apice densissime pilis nigris adpressis basifixis vestiti; bracteae lineares, 3 mm. longae; bracteolae nullae; pedicelli 1 mm. longi. Calyx campanulatus, 3 mm. longus, pilis nigris adpressis densissime vestitus, dentibus subulatis calycis tubum aequantibus. Corolla calycem multo superans; vexillum obovatum, emarginatum, 11 mm. longum, 5.5 mm. latum, alas carinamque superans; alarum lamina apice acuta, 5 mm. longa, 1.5 mm. lata, basi obtuse auriculata, ungui 4 mm. longo; carina 9 mm. longa, 2.5 mm. lata. Ovarium pubescens, stipitatum, 4-ovulatum; stigma nudum.

"Plant 1–2 ft. high. Flowers blue. On rocky, grassy slopes of side valleys on the eastern flank of the Lichiang Range. Lat. 27° 12′ N. Alt. 10,000–10,500 ft. June 1906. N.W. Yunnan." G. Forrest. No. 2379 (Herb. Edin.! et Kew!).

LOGANIACEAE.

170 **Buddleia heliophila,** W. W. Sm. Sp. nov.

Species ex affinitate *Buddleiae officinalis,* Maxim.; foliis fere sessilibus, calycis dentibus acutis, corollâ longiore, inter alia recedit.

Frutex 1–2 m. altus, ramulis teretiusculis, novellis dense incano-tomentellis. Folia vix petiolata, superiora ad 8 cm. longa, circ. 3 cm. lata, opposita, aequalia vel inaequalia, membranacea elliptica, apice breviter acuminata, basi subrotundata vel lata cuneata, integra, supra adpresse pilosula nervis obscuris, infra dense incano-stellato-tomentella nervis eminentibus tomentosioribus; folia juniora fulvido-tomentella. Thyrsi in apice ramorum crebri 4–8-flori, longiuscule pedunculati, pedicellis brevissimis dense tomentellis, floribus fere capitatis. Calyx circ. 2.5 mm. longus, dense stellato-tomentosus, dentibus triangularibus acutis vix 1 mm. longis. Corolla circ. 13 mm. longa, rosea; tubus 1 mm. latus in sicco, extus tomentellus intus pilosulus; lobi rotundati circ. 2.5 mm. diametro, intus glabri. Stamina in medio tubo affixa. Ovarium dense albo-pilosum. Fructus deest.

"Shrub of 3–6 ft. Flowers soft magenta rose shading to crimson at base. Open, sunny situations along the base of the eastern flank of the Tali Range.. Lat. 25° 40′ N. Alt. 7000–8000 ft. July 1910." G. Forrest. No. 6796.

Buddleia nana, W. W. Sm. Sp. nov.

Species affinis *Buddleiae brachystachyae,* Diels, eadem magnitudine habituque sed foliis calyceque diversa.

Frutex ramosus 30–60 cm. altus, ramulis mox glabrescentibus novellis albido-tomentellis. Folia opposita breviter (ad 2–3 mm.)

petiolata, ad 2.5 cm. longa, circ. 5 mm. lata, lanceolata, vel oblongo-lanceolata, acuta vel subobtusa, integra, supra sparse pilosula, infra densius stellato-tomentella, nervis utraque facie obscuris. Thyrsi breves 1.5–2 cm. longi, floribus 6–12 fere capitatis. Calyx tubulosus dense tomentellus; tubus 2 mm. longus; dentes triangulares vix 1 mm. longi. Corollae lavanduIaceae tubus 8 mm. longus extus stellato-pubescens; lobi rotundati circ. 3 mm. diametro intus glabri. Stamina in medio tubo inserta. Ovarium dense albo-pilosum. Fructus deest.

"Dwarf shrub of 1–2 ft. Flowers greyish lavender. Moist, open situations on the divide between the Sha-yang and Chutong valleys. Lat. 25° 20′ N. Alt. 6700 ft. April 1910." G. Forrest. No. 5519.

OLEACEAE.

Jasminum subhumile, W. W. Sm. Sp. nov.

Species affinis *Jasmino humili*, Linn., sed pedicellis calyceque dense minute villosis differt; haud remota ex descriptione ab *Jasmino pubigero*, Don, foliis trifoliatis fere glabris recedit.

Frutex 1–2 m. altus. Caulis flexuosus teres dense molliter albido-crispato-villosulus. Folia alterna trifoliolata; petioli 2.5–4 cm. longi, molliter villosuli; petioluli laterales circ. 1 mm. longi, medianus circ. 1 cm. longus; lamina 3–10 cm. longa, 1.5–2.5 cm. lata, mediana vix major, ovata vel ovato-lanceolata, apice obliqua vel deflexa, acuta vel subacuta, basi rotundata vel late cuneata, coriacea, supra glabra vel basi sparsissime pilosula, nervis obscuris infra pallidiora rugosula glabra, costâ pilosulâ exceptâ, nervis gracilibus circ. 5 paribus. Cymae fragrantes ad apices ramorum, 40–50–florae, dichotome divisae, molliter villosae; pedicelli 3–7 mm. longi; bracteae circ. 2 mm. longae lineares. Calyx circ. 2 mm. longus, apice 2 mm. latus, extus molliter villosulus, denticulis quinque minutis praeditus. Corolla hypocrateriformis, aurantiaca; tubus cylindraceus circ. 1 cm. longus; lobi 6–7 mm. longi, ovati, obtusi. Fructus deest.

"Shrub of 3–6 ft. Flowers orange yellow, fragrant. Moist, open situations in the Sha-yang valley. Lat. 25° 20′ N. Alt. 6000 ft. April 1910." G. Forrest. No. 5529.

"Shrub of 5–8 ft. Flowers bright yellow, fragrant. Moist, open situations in the Pu-piao valley. Lat. 25° 5′ N. Alt. 4000 ft. April 1910." G. Forrest. No. 5502, pro parte.

ORCHIDEAE.

Listera Wardii, Rolfe. Sp. nov.

Terrestris, 12–18 cm. alta. Caulis subgracilis, glaber, 9–11 cm.

longus. Folia opposita, sessilia, latissime ovata, brevissime apiculata, basi truncata, glabra, multinervia, 3–4 cm. longa, 4–5 cm. lata. Scapus gracilis, puberulus, 5–9 cm. longus, 5–10–florus. Bracteae ovatae vel oblongo-ovatae, subacutae, 5–7 mm. longae. Pedicelli 6–7 mm. longi. Flores mediocres. Sepala patentia, oblonga, subobtusa, 5–7 mm. longa. Petala linearia, subobtusa, 5–7 mm. longa. Labellum cuneato-obcordatum, apice breviter bilobum, subcrenatum, basi subcordatum, 1.3–1.4 cm. longum, 9–10 mm. latum, radiato-venosum, medio obtuse carinato. Columna arcuata, subclavata, 4 mm. longa.

"China :—N.W. Yunnan. Among the undergrowth of the temperate rain forest, with Oxalis, Arums, and Liliaceae, where the forest is densest. One of the few plants with green flowers. Salwen-Mekong divide, E. slope, 10,000 ft. June 1911." F. Kingdon Ward. No. 149.

Allied to *L. grandiflora*, Rolfe, but readily distinguished by its narrower cuneate-obcordate lip. The flowers are also rather smaller, the leaves broader, and the stem shorter.

Nervilia tibetensis, Rolfe. Sp. nov.

Tuber subglobosum, circiter 1.3 cm. latum. Folia non vidi. Scapi graciles, 15–20 cm. longi, vaginis spathaceis paucis obtecti. Bracteae lineari-lanceoatae, subobtusae, deflexae, 7–11 mm. longae. Pedicelli graciles, apice incrassati, 4–5 mm. longi. Ovarium ellipsoideum, 3 mm. longum. Sepala et petala subconniventia, lanceolata, breviter acuminata, 1.4–1.5 cm. longa. Labellum trilobum, 1.2 cm. longum, 1 cm. lati ; lobi laterales semioblongi, truncati, prominente radiato-venosi ; lobus intermedius obovato-quadratus, emarginatus, 4 mm. longus ; discus trinervis. Columna clavata, 6 mm. longa.

"Tibet :—Chamutang, Salwen River, 6000 ft. June 1911." F. Kingdon Ward. No. 151.

Allied to *Nervilia Aragoana*, Gaud. (*Pogonia flabelliformis*, Lindl.), but with a fewer-flowered inflorescence, more truncate side-lobes to the lip, and the column only a third as long as the sepals and petals.

Cypripedilum Wardii, Rolfe. Sp. nov.

Rhizoma repens ; radices numerosissimae. Caules erecti, 15–20 cm. longi, medio vel infra medium triphylli, basi vaginis spathaceis paucis obtecti. Folia alterna, subsessilia, elliptica vel lanceolato-elliptica, subacuta, 5–9 cm. longa, 1.5–3 cm. lata, venis numerosis, molliter pubescentibus. Scapi graciles, pubescens, 9–11 cm. longi, apice uniflori. Bracteae ovatae vel ovato-lanceolatae, pubescentes, 2–2.3 cm. longae. Pedicelli circiter 1 cm. longi, dense pubescentes. Flores mediocres.

Sepalum posticum elliptico-ovatum, acutum, 1.4 cm. longum 8 mm. latum, extus molliter pubescens; sepala lateralia connata, late ovato-elliptica, subobtusa, valde concava, 1.2 cm. longa, extus molliter pubescentia. Petala rhomboideo-oblonga, obtusa, 1.2 cm. longa, basi 5–6 mm. lata. Labellum ovoideo-globosum, 1.5 cm. longum, 8–9 mm. latum, lobi laterales late triangulares, subobtusi, 2–2.5 mm. longi. Columna 5 mm. longa. Staminodium ellipticum, obtusum, apice breviter recurvum, 3.5 longum.

"Tibet:—Above Salwen River, Kun-a-tong, 10,000 ft. Growing on limestone cliffs in shade of dense forest—temperate rain forest. Extensive root system corresponding to situation. June 1911." F. Kingdon Ward. No. 145.

Allied to *C. guttatum*, Swartz, but differing in its softly pubescent stems and smaller pubescent leaves, the latter being three in number and not turning black in drying, as *C. guttatum* invariably does. The flowers are also different in shape and texture, the dorsal sepal being broader and less acute, and the petals rhomboidly dilated at the base. The colour is not recorded on the sheet, but the dried specimen shows large purple spots on the lip, while the rest of the flower is pale in colour.

PRIMULACEAE.

Androsace Wardii, W. W. Sm. Sp. nov.

Species ex affinitate *A. Bulleyanae*, G. Forrest sed minor; foliis et calyce distinguenda; ab *A. Chamaejasme*, Host. foliis diversis atque corollâ miniatâ inter alia recedit.

Planta plus minus caespitosa stolonifera, habitu *A. Chamaejasme*. Folia variabilia, omnia rosulata, nunc circ. 1 cm. longa, 3–4 mm. lata, obovata, apice fere rotundata, breviter petiolata, nunc circ. 3 cm. longa (cum petiolo), circ. 3 mm. lata, lineari-oblanceolata, apice subobtusa, basi in petiolum satis longum attenuata, omnia aeque et utrinque pilosula, vix (nisi primaria) margine pilis longis obsita. Scapi 3–7 cm. longi, 3–5-flori, ± sparse pilis brevibus praediti. Bracteae 2–3 mm. longae, quam pedicelli 2–4-plo breviores, oblanceolatae, subobtusae, albo-pilosulae; pedicelli 4–12 mm. longi, flexiles, ± dense pilosuli. Calyx campanulatus vix ad medium partitus, circ. 3 mm. longus, densius albo-pilosulus; lobi subtriangulares, subobtusi. Corollae miniatae tubus calycem aequans; lobi obcordati; limbus 6–8 mm. diametiens. Semina ?

"N.W. Yunnan, at Atuntsi, at an elevation of 14,000 ft., growing among dwarf Rhododendron in rocky, open valleys." F. Kingdon Ward. No. 170.

This species recalls *A. Bulleyana,* but is not so robust, and the leaves are not mucronate. In many ways it approaches *A. Chamaejasme,* but the leaves do not have the characteristic fringe of long hairs, but are finely pilose all over.

RANUNCULACEAE.

[illegible] **Delphinium Beesianum,** W. W. Sm. Sp. nov.

Species affinis *Delphinio likiangensi,* Franch.; habitu ramosiore, foliorum segmentis angustioribus, bracteis diversis, sepalis extus longiuscule albo-setosis inter alia recedit.

Planta nana 15–30 cm. alta, basi reliquiis foliorum fibrosis induta. Caulis flexuosus, e basi ramosus, teres, plus minusve dense adpresse albo-pilosus. Folia et basalia et caulina longe petiolata, petiolo ad 12 cm. longo; lamina alte 5–fida, ambitu orbicularia, 5–6 cm. diametro, segmentis iterum ad mediam partem vel ultra in lobos 2–3 lineares 1–2 cm. longos acutos divisis, supra breviuscule, infra dense longiuscule albo-pilosa; folia superiora minora sensim in bracteas trifidas 5–15 mm. longas transeuntia. Flores solitarii vel 2–3 in apice ramulorum; pedunculi 2–3 cm. longi, albo-pilosi. Perianthium ex collectore coeruleum venulis intensius coloratis, extus dense pilis longis albis obsitum. Sepalum posticum calcare 2–2.5 cm. longo albo-piloso, stricto vel apice paulo curvato, pedunculum aequante atque ei plerumque contiguo praeditum; lamina circ. 2.5 cm. longa, oblonga; lateralia 2.5–3 cm. longa, oblonga, apice rotundata. Petala superiora glabra cum calcare quam calcar sepalinum paulo breviore fere 3.5 cm. longa; lamina anguste oblonga, circ. 4 mm. lata, subcoriacea; petala inferiora oblique obovata, fere 1.5 cm. longa, glabra, apice erosa. Carpella 5; ovaria albo-pilosa.

" Plant of 6–12 inches. Flowers blue, with deeper veinings. Rare on ledges of limestone cliffs on the eastern flank of the Lichiang Range. Lat. 27° 30′ N. Alt. 14,000 ft. September 1910." G. Forrest. No. 6694.

The species is closely akin to *D. likiangense,* Franch., collected also by Forrest in the Lichiang Range, but is at once distinguished by the bracts and sepals.

3631 **Delphinium calcicolum,** W. W. Sm. Sp. nov.

Species affinis *Delphinio Beesiano,* W. W. Sm.; foliis glabrioribus, pedunculis longiusculis, bracteis diversis, floribus minoribus minute albo-pilosulis recedit.

Planta nana 7–20 cm. alta, basi reliquiis foliorum fibrosis induta. Caulis flexuosus, laxe ramosus, teres, plus minusve

sparse albo-pilosus. Folia et basalia et caulina longe petiolata, petiolo ad 12 cm. longo ; lamina alte 3–5–fida, ambitu orbicularia, ad 8 cm. diametro, segmentis integris vel iterum ad mediam partem in lobos 2–3 lineares 1–3 cm. longos acutos divisis, supra minute pilosula, infra sparse pilosa ; folia superiora minora, sensim in bracteas integras vel 2–3–fidas ad 2 cm. longas transeuntia. Flores solitarii in apice ramulorum vel in scapo aphyllo brevi ; pedunculi 4–5 cm. longi, adpresse albo-pilosi. Perianthium coeruleum extus minute albo-pilosulum. Sepalum posticum calcare 2 cm. longo minute pilosulo, stricto vel apice paulo curvato, quam pedunculus circ. 2–plo breviore atque ab eo fere recto angulo abeunte praeditum ; lamina circ. 2 cm. longa, oblonga ; lateralia 2 cm. longa, oblonga, obtusa. Petala superiora glabra cum calcare fere 3.5 cm. longa ; petala inferiora oblique obovata, circ. 1.5 cm. longa, glabra, apice bifida. Carpella 5 ; ovaria albo-pilosa.

"Plant of 3–8 inches. Flowers blue. On limestone drift on the western flank of the Lichiang Range. Lat. 27° 35′ N. Alt. 12,000 ft. August 1910." G. Forrest. No. 6364.

Very closely allied in habit, leaves and flowers to *D. Beesianum*, W. W. Sm., from which I have separated it with some hesitation by the characters given above.

ROSACEAE.

Spiraea calcicola,* W. W. Sm. Sp. nov.

Species habitu *Spiraeae arcuatae*, Hook. f. ; ramis longissime arcuatis rubris glabris, foliis minimis obovatis integris glabris conspicua.

Frutex 60–150 cm. altus, ramulis superioribus circ. 30 cm. longis patentibus arcuatis angulatis rubris glabris nitidis sparse foliatis prope basin subnudis. Folia (superiora juvenilia tantum visa tempore florendi) 5–7 mm. longa, circ. 3 mm. lata, 3–5–fasciculata in ramulo brevissimo, folio axillante delapso, e gemma squamis membranaceis ciliatis praeditâ orta, obovata vel elliptica, apice rotundata, basi cuneata, primo vix petiolata, chartacea, integerrima, glabra, supra viridia nervis obscuris, infra pallidiora subtrinervia. Inflorescentiae angustissimae circ. 12 cm. longae, in apice ramulorum, e fasciculis 12–15, circ. 6–8–floris compositae ; flores arcte corymbosi pedicellis circ.

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* A Spiraea corresponding to the above has been grown (May 1913) by Bees Limited from seeds sent by Mr. Forrest. The older leaves are sometimes entire, sometimes with one or two faint notches near the apex ; a short petiole about 2 mm. long is developed and the lamina reaches 1 cm. long, with pellucid veins. The young shoots are at the first sparsely pilose, soon becoming glabrous and of a reddish hue.

5 mm. longis et basi foliis 3–5 minutis praediti. Calyx circ. 3 mm. longus, extus glaber, intus glaber vel sparse pilosulus, fere ad mediam partem in lobos triangulares obtusos partitus. Petala calycem superantia obovata, alba, extus saturate roseo-tincta. Stamina circ. 20. Carpella 5 glabra; discus albo-pilosulus. Fructus deest.

"Shrub of 2–5 ft. Flowers white, exterior deep rose. Crevices of dry limestone cliffs on the eastern flank of the Lichiang Range. Lat. 27° 20′ N. Alt. 11,000–12,000 ft. June 1910." G. Forrest. No. 5730.

A species remarkable for its long, slender, curved branches, with small leaves. With the exception of the bud-scales and the disc, the plant is quite glabrous.

SAXIFRAGEAE.

160 **Saxifraga atuntsiensis,** W. W. Sm. Sp. nov.

Species minima, affinis *S. microphyllae*, Royle; petalis 2–3-plo sepalis longioribus inter alia distincta.

Planta perpusilla, glaberrima, dense caespitosa. Folia omnia basalia dense rosulatim conferta, vix 1 mm. longa, obovata, integerrima, glaberrima, nitentia, carnosula. Pedicelli circ. 1 cm. longi, gracillimi, uniflori, sparse glanduloso-puberuli, aphylli. Sepala 1–1.5 mm. longa, oblonga, glabra, obtusa, primo erecta, deinde patentia. Petala 3–4 mm. longa, vix 1 mm. lata, lineari-oblonga, subobtusa, trinervia, flava. Stamina pistillum primo superantia. Ovarium immaturum ovoideum.

"China:—N.W. Yunnan, at Atuntsi, an alpine grassland plant growing along the headwaters of the streams at an elevation of 15,000 ft. July 1911." F. Kingdon Ward. No 43.

Closely allied to the dwarf Himalayan Saxifrages, nearest to *S. microphylla*, but with very different flowers.

161 **Saxifraga consanguinea,** W. W. Sm. Sp. nov.

Species valde affinis *Saxifragae piliferae*, Hook. f. et Thoms. ex Himalaya orientali; habitu compactiore, foliis magis imbricatis et margine minute ciliatis, inflorescentiis plurifloris, inter alia signa recedit.

Planta caespitosa, erecta, 3–4.5 cm. alta, radicibus fibrosis, turionibus sarmentosis filiformibus ad 15 cm. longis vel ultra, apice gemmiferis praedita; habitus ei *S. piliferae* similis. Caulis simplex puberulus, inflorescentiâ corymbosâ densâ 5–8-florâ terminatus. Folia infima dense rosulatim conferta, 6–9 mm. longa, 2 mm. lata, lineari-oblonga, basi subamplexicaulia, apice subacuta mucronulata, margine minute ciliato-spinulosa, cetera glabra; superiora laxius imbricata, 5–10 mm. longa, 1–1.5 mm. lata, linearia, acuta vel subacuta, margine minute ciliata, rugosula, in bracteas simillimas sed minores abeuntia. Pedicelli circ. 5 mm. longi, sparse fusco-villosi. Flores eis *S. piliferae* similes, paulo majores. Sepala circ. 3 mm. longa, oblongo-ovata, obtusissima, carnosula, extus sparse pilosula, intus glabra. Petala in sicco rubro-purpurascentia, circ. 3 mm. longa, obovata, trinervia. Ovarium (immaturum) disciforme stylis brevissimis erectis coronatum.

"China:—At Atuntsi, N.W. Yunnan, near the Tibetan frontier, at an elevation of 16,000 ft. July 1911." F. Kingdon Ward. No. 44.

This species of the Chinese Western Ranges corresponds to the Himalayan *S. pilifera*, from which it differs in minor points. It is more compact with more imbricate leaves which are much less puberulous, the inflorescence is many flowered, the sepals fleshy and more obtuse, the petals more rounded at the apex. It is very closely allied, however, and in structure of leaf, sepal, petal, and especially ovary, it is scarcely different from its Himalayan congener.

Saxifraga finitima, W. W. Sm. Sp. nov.

Species affinis *Saxifragae Stella-aureae*, Hook. f. et Thoms. sed pedicellis saepius unifoliatis, et floribus majoribus inter alia distincta.

Planta dense caespitosa caudiculis lignosis, dense foliosis, caulibus floriferis undique glanduloso-puberulis unifloris. Folia densissime rosulatim conferta, sessilia, circ. 3 mm. longa, circ. 1 mm. lata, oblonga, obtusa, carnosula, nitentia, margine glanduloso-ciliata, nervis obscuris. Pedicelli circ. 3 cm. longi, glanduloso-puberuli, folio mediano circ. 3 mm. longo lineari glanduloso-ciliato praediti. Sepala 3–4 mm. longa, circ. 1.5 mm. lata, reflexa, oblonga, obtusa, parce margine glanduloso-ciliata, cetera glabra, viridia. Petala erecto-patentia, 5–6 mm. longa, circ. 3 mm. lata, late elliptica, brevissime unguiculata, obtusa, 5-nervia, flava. Stamina filiformia sepalis paulo longiora. Capsula immatura, circ. 3 mm. longa, ovato-globosa, stylis brevissimis erectis coronata.

"China:—N.W. Yunnan, at Atuntsi, at an elevation of 16,000 ft. on boulders and screes. July 1911." F. Kingdon Ward. No. 47.

A near relative of the Himalayan *S. Stella-aurea*, Hook. f. et Thoms., but easily distinguished by the larger flowers and the linear bracts (sometimes absent) placed at, or a little below, the middle of the pedicel.

Saxifraga flexilis, W. W. Sm. Sp. nov.

Species ex affinitate *Saxifragae drabaeformis*, Franch. ; caulibus flexuosis, foliis pedunculisque eglandulosis, inter alia signa conspicua.

Radix ad 10 cm. longa, fibrosa, cujus e collo caules numerosi oriuntur. Caules alii longiories suberecti vel procumbentes, 6–7 cm. longi, flexuosi, sparsius foliis eciliatis praediti ; alii brevissimi (juniores) 1–1.5 cm. longi, dense foliis ciliatis rosulatim obsiti ; hi steriles, illi divaricato-ramosi, 2–3–floriferi, glabri, eglandulosi rubescentes. Folia caulium breviorum 3–4 mm. longa, dense conferta, lanceolata vel oblanceolata, mucronata, sparse albo-setoso-ciliat ; folia caulium longiorum 6–8 mm. longa, vix. 2 mm. lata, laxa, lineari-lanceolata, subacuta, glabra, nervis obscuris. Pedicelli 2–3 ad 4 cm. longi, late divaricati, flexuosi, glabri. Sepala sub anthesin reflexa, oblonga, obtusa, 2–5 mm. longa, glabra, nervis obscuris, Petala oblonga vel oblongo-ovata, circ. 6 mm. longa, circ. 2–5 mm. lata, trinervia, flava. Stamina ovarium primo superantia filamentis circ. 2–5 mm. longis. Ovarium ovoideum in stylos breves paulo divaricatos exiens. Capsula matura . . .

"China :—N.W. Yunnan, near Atuntsi, at an elevation of 15,000 ft. September 1911." F. Kingdon Ward. No. 45.

1614 **Saxifraga Wardii,** W. W. Sm. Sp. nov.

Species valde affinis *Saxifragae brachypodae*, Don, sed foliis lanceolatis, floribus fere duplo majoribus, calyce densius glanduloso-ciliato, petalis glandulo-marginatis recedit.

Planta laxe caespitosa ; caules suberecti vel adscendentes, 5–7 cm. longi, simplices, dense foliosi, infra glabri, supra dense glandulosi, apice uniflori. Folia lanceolata, 9–11 mm. longa, 3–5 mm. lata, apice acuta mucronata, basi subrotundata, vix cordatula, semi-amplexicaulia, suberecta nec patentia, rigidula, spinulosa, albo-marginata, nitida, subtus pallidiora ; gemmae desunt. Pedunculus 2–10 mm. longus, saepe foliis tectus, glandulosus. Calycis laciniae 5–6 mm. longae, 2–3 mm. latae, subacutae nec mucronatae, dense glanduloso-ciliatae, in sicco atro-purpureae. Petala obovata 9–10 mm. longa, ad 7 mm. lata, 5–7–nervia, flava. Stamina pistillum paullum superantia filamentis circ. 3 mm. longis. Ovarium (immaturum) circ. 2–5 mm. longum, oblongo-ovoideum, in stylos 1 mm. longos, vix divaricatos exiens. Capsula . . .

"China :—N.W. Yunnan, near Atuntsi, at an altitude of 14,000 ft. September 1911." Coll. F. Kingdon Ward. No. 46.

A near ally of *Saxifraga brachypoda*, Don, but at once distinguished by the very large flower.

SCROPHULARINEAE.

Pedicularis atuntsiensis, Bonati. Sp. nov.

Sectio Pectinatae.

Perennis; pluricaulis. Caules 10–20 cm. alti, erecti, flexuosi, simplices, glabri. Folia inferiora perennia, longe petiolata; petiolis 40–45 mm. longis, basi dilatatis; limbo 15–25 mm. longo, ovato-oblongo, pinnatisecto; foliolis 9–13 breviter petiolatis, ovato-obtusis, bipinnatilobulatis. Folia caulinaria verticillata vel aliquando opposita petiolis 25 mm. longis; limbo ovato-obtuso, circiter 20 mm. longo. Folia superiora 4-verticillata, subsessilia, bipinnatifida, lobis acutis. Bracteae inferiores foliaceae; superiores dilatatae ac basi membranaceae. Flores 4-verticillati, breviter pedunculati; pedunculis circiter 2 mm. longis. Calyx vesiculosus, membranaceus, perlucidus, 5-angulosus; nervis 15 eminentibus plus minusve reticulatis; tubo 2–2.5 mm. longo; dentibus quinque, 1 mm. longis; summo integro, lateralibus lanceolatis, acutis, incisis. Corolla purpurea; tubo calyce duplo longiore; galea in parte erecta 5 mm. longa, ad dorsum rotunda ac in apicem falcatum; 10 mm. longum, lente attenuata, labio inferiore sessile, 10 mm. longo; lobis rotundis, medio lateralibus paulo latiore, haud proeminente, margine ciliato. Staminum filamenta medio tubi inserta, omnia glabra. Capsula ac semina?

"China:—N.W. Yunnan, at Atuntsi. Alt. 14,000 ft. July 1911." F. Kingdon Ward. No. 115.

This new species comes nearest to *P. ramosissima*, Bonati, but is distinguished at once by the simple stems, by the small size, by the more elongated corolla tube, by the longer beak and longer lower lip, etc.

Pedicularis pseudo-ingens, Bonati. Sp. nov.

Sectio Tristes.

Caulis circiter 45 cm. altus, angulosus, erectus, flexuosus, pilis albis crispis paucis sparsus. Folia sessilia, auriculata, glabra, vel paulo villosa, lineato-lanceolata, acuta, 6–8 cm. longa, 6–7 mm. lata, pennatilobata; lobis plurimis, obtusis, 2–3 mm. longis, 2 mm. latis, acutidentatis. Bracteae inferiores foliaceae, superiores prope integrae, basi ac margine lanatao, summo glabrae, flores longe superantes. Flores sessiles, in uva elongata densa lanata. Calyx 11 mm. longus, dentibus lineato-lanceolatis, acutis, 5 mm. longis, basi 1.5–2 mm. latis. Corolla sicut in *P. ingens*, Maxim. et aequaliter longa (22 mm.) sed tubo breviore 9.5–10 mm.; galea 12–13 mm. longa; labio 8–9 mm. longo. Staminum filamenta ad tertium inferius tubi inserta, omnia glabra.

"China :—N.W. Yunnan, at Atuntsi. Alt. 14,000 ft. July 1911." F. Kingdon Ward. No. 130.

A plant very near to *Pedicularis ingens*, Maxim, of which it is possibly a dwarf southern form. It differs from it by—

(1) Its small size;
(2) Its smaller leaves with lobes not mucronate;
(3) Its more elongated, linear-lanceolate pointed calyx lobes;
(4) Its shorter corolla tube, longer hood, and smaller lip;
(5) Its glabrous stamens inserted lower down.

THYMELAEACEAE.

Wikstroemia lichiangensis, W. W. Sm. Sp. nov.

Species affinis *Wikstroemiae angustifoliae*, Hemsl.; foliis approximat, floribus tomentosis recedit.

Frutex 1.5–3 m. altus, ramosus, bene foliatus, ramulis novellis teretibus gracilibus dense incano-tomentosis, senioribus glabris cortice griseo ruguloso praeditis. Folia 1.5–3 cm. longa, .5–1 cm. lata, alterna, oblanceolata vel oblonga, apice rotundata vel obtusa, basi late cuneata, chartacea, integra, margine paulo revoluta, supra viridia rugosula sparsius incano-pilosula nervis obscuris, infra pallidiora sparse pilosula nervis eminentibus pilosioribus. Inflorescentiae numerosae vel ramulos terminantes vel prope apices exaxillares (in medio internodio) orientes, 5–15-florae, pedunculis 5–10 mm. longis incano-tomentosis, floribus fere capitatis, pedicellis vix 1 mm. longis, bracteis nullis. Calycis tubus circ. 1 cm. longus, 1 mm. latus, extus dense incano-tomentosus; lobi 4, circ. 2 mm. longi, subrotundati, extus tomentosi, intus glabri viridi-lutei. Stamina 8, biseriata. Ovarium villosum stylo brevi, stigmate capitato magno. Fructus deest.

"Shrub of 5–9 ft. Flowers greenish yellow. Dry, open situations amongst scrub on the eastern flank of the Lichiang Range. Lat. 27° 20′ N. Alt. 11,000 ft. May 1910." G. Forrest. No. 5664.

"Shrub of 4–8 ft. Flowers dull rose. Dry situations on the margins of pine forests on the eastern flank of the Lichiang Range. Lat. 27° 25′ N. Alt. 9000–10,000 ft. October 1910." G. Forrest.

Propagation of Mutisia decurrens, Cav.

BY

LAURENCE BAXTER STEWART,

Plant Propagator in the Royal Botanic Garden, Edinburgh.

With Plate XXVIII.

ALTHOUGH this plant has been known in cultivation for many years, it cannot be said that it is as widely grown as it might be. This is a great pity, for every one must admit that when well grown it forms a picture beautiful in any garden. Perhaps the chief reason for the comparative rarity of this plant in gardens is the impression that its propagation is difficult. But there is no difficulty if the right methods be adopted.

The usual practice is to take as cuttings young shoots as they appear above the ground and with them a piece of stolon is cut. In many cases such shoots may be obtained with roots already attached. This, however, is a crude method, and one which may result in damage to the parent plant. These shoots are those which produce the flowers. Every shoot of the kind that is removed means loss of so much flower. It is, therefore, essential to ensure a good supply of bloom that these shoots be allowed to remain on the parent plant. It has only to be known that portions taken from any part of the plant will give successful cuttings to put out of count this old wasteful method.

After the flowering season is over, that is to say after the end of August or the beginning of September, it may be found advisable to thin out some of the old flowering stems that have grown into a tangled mass. From these thinnings a supply of material suitable for cuttings may be obtained.

Perhaps the most successful method of striking these is as follows :—

Select a frame with a shady exposure and in it place one foot of drainage. Over this place some rough material such as leaves to prevent the drainage from becoming choked up, and finally a layer of pure sand, say about eight inches deep.

In preparing the cuttings it is not necessary that they should be cut beneath a node, but anywhere that is most

[Notes, R.B.G., Edin., No. XXXVII, Nov. 1913.]

convenient. A suitable length for cuttings is from six to eight inches, and no leaves must be removed from them. When inserting the cuttings it is not advisable to make holes, but just press the basal end into the sand deep enough to enable the cutting to stand erect. This brings the lower portion into contact with the moist sand in such a manner as will promote immediate root growth.

After the cuttings are inserted a steady temperature of about 58° F. must be maintained. Water of the same temperature as that in the propagating frame should be given—using a fine rose—in liberal quantities at least once a day, or more frequently in bright weather. On warm, sunny days, or during drying winds, it will be found beneficial to water every hour from 7 a.m. to 5 p.m.

The summit portion of a shoot roots more readily than does the basal portion, the reason being that the growing points have not yet become so woody and are thus in a better state for producing roots. If the older portions, however, are used, and the water supply kept up, they will root, although they may be a fortnight or three weeks later of doing so.

It is not advisable to leave the cuttings long in the sand after roots have commenced to form, but as soon as these are two to three inches long, the plants should be potted up. A suitable compost for potting consists of three parts loam and one part crock dust.

After potting, which must not be done too firmly, the plants should be placed back into the frame in which they were struck and receive a thorough watering. Water must then be withheld from the roots until the compost in the pots becomes somewhat dry, but in order to reduce transpiration and prevent flagging the foliage should be frequently lightly sprayed.

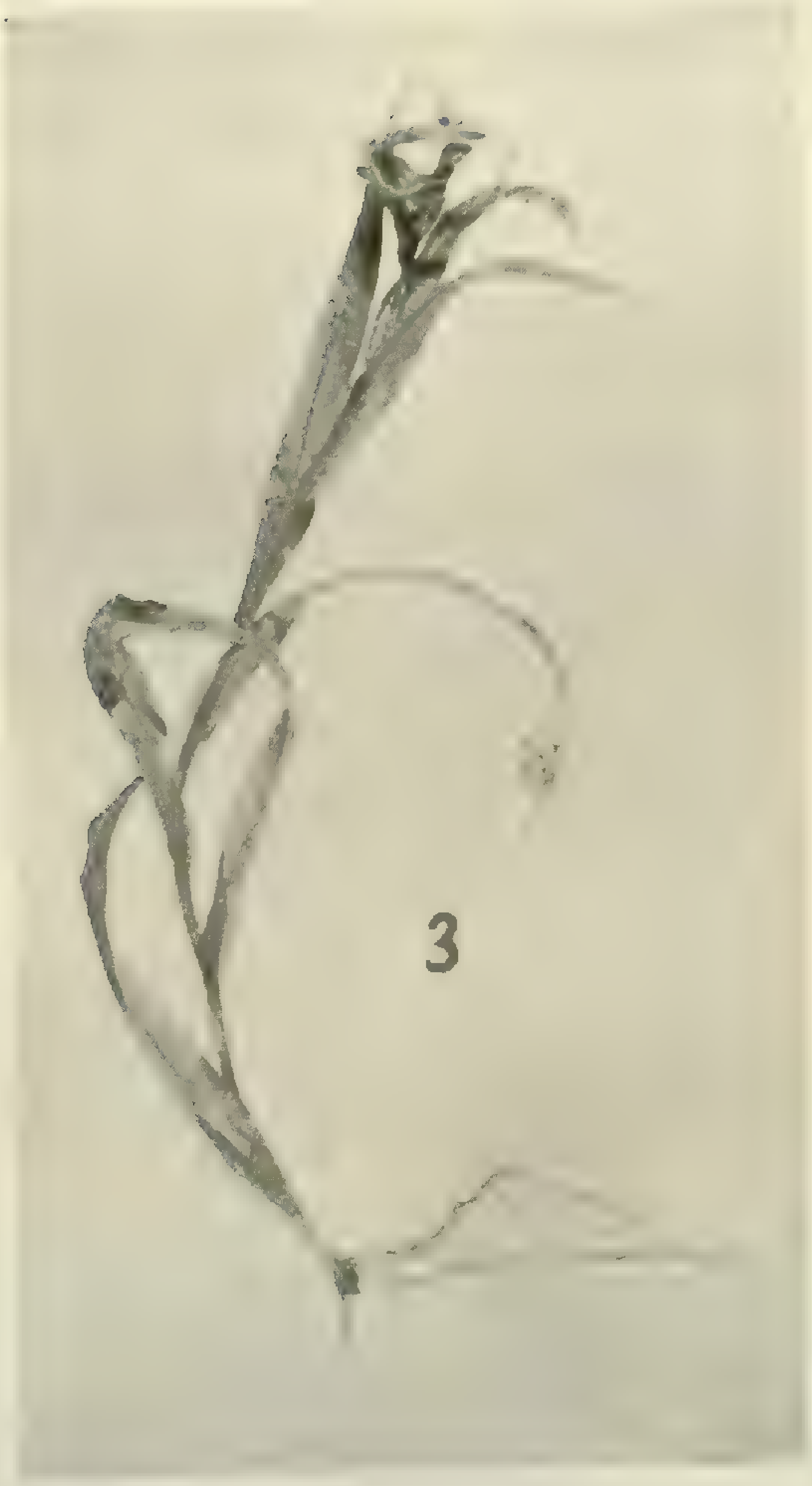
After an interval of about a week from the time of potting the roots of many of the cuttings will appear at the sides of the pots. These plants can then safely be removed to a cool house there to remain until they are required for planting in border or greenhouse.

EXPLANATION OF PLATE XXVIII.

Illustrating L. B. Stewart's Paper on Mutisia decurrens, Cav.

The plate is taken from a photograph by Mr. R. M. Adam of rooted cuttings in the Royal Botanic Garden, Edinburgh.

FIG. 1. Intermediate stem-cutting—moderate development of root.
FIG. 2. Basal stem-cutting—poor development of root.
FIG. 3. Apical stem-cutting—strong development of root.



CUTTINGS OF MUTISIA DECURRENS, CAV.

ENUMERATION OF CRASSULACEAE

Collected in China
by
Bullock, Carles, Ducloux, Forrest (second expedition), Hancock, Henry, Hosie, Hugh, Maire, Monbeig, Morse, Pratt, Wilson,
with
a comparative table, including the species of Delavay and Forrest's first expedition.

BY

RAYMOND HAMET,
Paris.

I. COLLECTION OF PROF. T. L. BULLOCK.

Sedum drymarioides, Hance, var. **genuinum,** Raymond Hamet. Kewkiang, Lushan Mountains. Flowers white. 20th June 1892. Bullock, n. 176. Herb. Kew.

II. COLLECTION OF W. R. CARLES, C.M.G.

Sedum drymarioides, Hance, var. **genuinum,** Raymond Hamet. Kewkiang Hills. Flowers white. 20th June 1892. Carles. Herb. Edinburgh.

Sedum drymarioides, Hance, var. **stellariaefolium,** Raymond Hamet. Peking Hills. Flowers yellow. 15th August 1885. Carles. Herb. Edinburgh.

III. COLLECTION OF ABBÉ DUCLOUX.

Sedum Leblancae, Raymond Hamet. China, Yunnan. Ducloux, n. 577. Herb. Kew.

Sedum multicaule, Wallich. China, Yunnanfu. Ducloux, n. 176. Herb. Kew.

Sedum yunnanense, Franchet, var **valerianoides,** Raymond Hamet. China, Yunnanfu. Ducloux, n. 451♂. Herb. Kew.

[Notes, R.B.G., Edin., No. XXXVII, Nov. 1913.]

IV. COLLECTION OF G. FORREST.

SECOND EXPLORATION, 1910.

Sedum Beauverdi, Raymond Hamet.

Yunnan. G. Forrest. No. 7205.

Sedum bracteatum, Diels.

Yunnan, eastern flank of the Lichiang Range. Lat. 27° 30′ N. Shady situations in mixed forests. Alt. 11,000 ft. Plant of 6–10 inches. Flowers orange yellow. September 1910. G. Forrest. No. 6736.

Yunnan. G. Forrest. No. 6998.

Sedum bupleuroides, Wallich.

Yunnan, eastern flank of the Lichiang Range. Lat. 27° 15′ N. Open mountain pasture. Alt. 12,000 ft. Plant of 4–8 inches. Flowers deep reddy green. June 1910. G. Forrest. No. 5690.

Sedum Chauveaudi, Raymond Hamet.

Yunnan, 1910. G. Forrest. No. 7200.

Sedum fastigiatum, Hooker f. et Thomson.

Yunnan, eastern flank of the Lichiang Range. Lat. 27° 30′ N. Ledges of limestone cliffs. Alt. 11,000–12,000 ft. Plant of 6–12 inches. Flowers pale lemon yellow. June 1910. G. Forrest. No. 6029.

Sedum Forresti, Raymond Hamet.

Yunnan, eastern flank of the Lichiang Range. Lat. 27° 30′ N. On limestone drift. Alt. 14,000–15,000 ft. Plant of 1–2 inches. Flowers bright brassy yellow. July 1910. G. Forrest. No. 6117.

Sedum indicum, Raymond Hamet, var. **genuinum,** Raymond Hamet.

Yunnan, dry situations amongst rocks on the divide between the Hoching and Lichiang Valleys. Lat. 26° 40′ N. Alt. 8000 ft. Plant of 3–6 inches. Flowers greenish-purple. In seed in November 1910. G. Forrest. No. 7351.

Sedum linearifolium, Royle, var. **Balfouri,** Raymond Hamet. —*Sedum trifidum,* Wallich, var. *Balfouri,* Raymond Hamet.

Yunnan, eastern flank of the Lichiang Range. Lat. 27° 25′ N. On moist, shady rocks. Alt. 11,000–13,000 ft. Plant of 2–4 inches. Flowers greenish white. August 1910. G. Forrest. No. 6400.

Sedum multicaule, Wallich.

Yunnan, eastern flank of the Lichiang Range. Lat. 27° 30′ N. Stony pasture. Alt. 10,000 ft Plant of 3–5 inches. Flowers bright yellow. September 1910. G. Forrest. No. 6542.

Yunnan. G. Forrest. No. 6839.

Yunnan. G. Forrest. No. 6919

Sedum Oreades, Raymond Hamet.

Yunnan, eastern flank of the Lichiang Range. Lat. 27° 35′ N. Moist, stony, alpine pasture. Alt. 14,000–15,000 ft. Plant of 1½–2½ inches. Flowers bright golden yellow. August 1910. G. Forrest. No. 6511.

Yunnan. G. Forrest. No. 7212.

Sedum platysepalum, Franchet.

Yunnan, south end of the Lichiang Range. Lat. 27° 10′ N. Dry, stony pasture. Alt. 9000 ft. Plant of 2–4 inches. Flowers golden yellow. October 1910. G. Forrest. No. 7393.

Sedum primuloides, Franchet.

Yunnan, eastern flank of the Lichiang Range. Lat. 27° 20′ N. Crevices of limestone cliffs. Alt. 12,000 ft. Plant of ½ inch. June 1910. G. Forrest. No. 5792.

Yunnan, eastern flank of the Lichiang Range. Lat. 27° 35′ N. On humus-covered boulders. Alt. 12,000–13,000 ft. Plant of 1–2 inches. Flowers white. September 1910. G. Forrest. No. 6705.

Sedum roseum, Scop., var.

Yunnan, 1910. G. Forrest. No. 6938.

Sedum roseum, Scop., var.

Yunnan, eastern flank of the Lichiang Range. Lat. 27° 30′ N. Crevices and ledges of limestone cliffs. Alt. 11,000–12,000 ft. Plant of 6–8 inches. Flowers green. July 1910. G. Forrest. No. 6065.

Yunnan, eastern flank of the Lichiang Range. Lat. 27° 40′ N. On cliffs and humus-covered boulders. Alt. 11,000 ft. Plant of 9–15 inches. Flowers yellowish-green. July 1910. G. Forrest. No. 6135.

Sedum rotundatum, Hemsley.

Yunnan, eastern flank of the Lichiang Range. Lat. 27° 30′ N. Stony, alpine pasture. Alt. 13,000–14,000 ft. Tufted plant of 12,000–18,000 inches. Flowers deep rose. September 1910. G. Forrest. No. 6622.

Sedum scabridum, Franchet.

Yunnan, western flank of the Lichiang Range. Lat. 27° 30′ N.

Crevices of limestone cliffs. Alt. 12,000 ft. Tufted plant of 1–3 inches. Flowers yellowish red. June 1910. G. Forrest. No. 6022.

Yunnan, eastern flank of the Lichiang Range. Lat. 27° 30′ N. Crevices of limestone cliffs and boulders. Alt. 12,000 ft. Plant of 4–6 inches. In seed in June 1910. G. Forrest. No. 5965.

Sedum tenuifolium, Franchet.

Yunnan, eastern flank of the Lichiang Range. Lat. 27° 30′ N. On rocks in pine forests. Alt. 11,000 ft. Plant of 2–5 inches. Flowers brassy yellow. August 1910. G. Forrest. No. 6626.

Sedum trullipetalum, Hooker f. et Thomson.

Yunnan, eastern flank of the Lichiang Range. Lat. 27° 25′ N. Crevices of boulders and ledges of cliffs. Alt. 9000–10,000 ft. Plant of 2–4 inches. Flowers brassy yellow. October 1910. G. Forrest. No. 7392.

Sedum yunnanense, Franchet, var. **Forresti,** Raymond Hamet.

Yunnan, eastern flank of Lichiang Range. Lat. 27° 25′ N. Ledges of cliffs and on humus-covered boulders. Alt. 11,000–13,000 ft. Plant of 9–16 inches. Flowers ruddy green. Foliage purplish-red. June 1910. G. Forrest. No. 5963 ♀ ♂.

Sedum yunnanense, Franchet, var. **valerianoides,** Raymond Hamet.

Yunnan, eastern flank of the Lichiang Range. Lat. 27° 20′ N. Shady situations in mixed forests. Alt. 10,–11,000 ft. Plant of 1–2 ft. Flowers green. June 1910. G. Forrest. No. 5947 ♂.

Yunnan, eastern flank of the Lichiang Range. Lat. 27° 20′ N. Ledges of shady cliffs in pine forests. Alt. 10,000–11,000 ft. Plant of 1–2 ft. Flowers green. July 1910. G. Forrest. No. 6121 ♂.

ERRATA

of

Raymond Hamet. Enumeration and Description of Species of Sedum in Plantae Chinenses Forrestianae; plants discovered and collected by George Forrest during his first exploration of Yunnan and Eastern Tibet in the years 1904, 1905, and 1906.—Notes Roy. Bot. Gard. Edin. vol. v.

P. 119, for Sedum trifidum, Wallich, var. Balfouri, Raymond Hamet, *read* Sedum linearifolium Royle, var. Balfouri, Raymond Hamet.

For Sedum trifidum, Wallich, var. Forresti. Raymond Hamet, *read* Sedum linearifolium, Royle, var. Forresti, Raymond Hamet.

P. 120, for Sedum Alfredi, Hance, *read* Sedum bracteatum, Diels.

V. COLLECTION OF W. HANCOCK.

Sedum multicaule, Wallich.

Yunnan, Mengtz, mountain rocks. 6000 ft. 15th September 1895—Hancock, n. 196. Herb. Kew.

VI. COLLECTION OF PROF. A. HENRY.

Sedum Barbeyi, Raymond Hamet.

China, Prov. Hupeh—Henry, n. 7002. Herb. Mus. Paris (type) and Bot. Gard. St. Petersburg.

Sedum bracteatum, Diels.

China, Prov. Hupeh, Tang—Henry, n. 5946A and 5946C. Herb. Kew.

China, Prov. Hupeh, N. Patung—Henry, n. 5946B. Herb. Kew, British Museum, and Bot. Gard. St. Petersburg.

China, Prov. Hupeh, Chienduh—Henry, n. 5946. Herb. Kew and Bot. Gard. St. Petersburg.

Central China, Prov. Hupeh—Henry, n. 4888. Herb. Edinburgh.

China, Patung District, Ichang—Henry, n. 4888. Herb. Bot. Gard. St. Petersburg.

Sedum Dielsi, Raymond Hamet.

China, Ichang, on mountains, 2500 ft.—Henry, n. 961. Herb. Kew.

Sedum drymarioides, Hance, var. **stellariaefolium,** Raymond Hamet.

China, Prov. Hupeh—Henry, n. 6240. Herb. Mus. Paris, Calcutta, Bot. Gard. St. Petersburg.

China, Prov. Hupeh—Henry, n. 7395. Herb. Mus. Paris, Bot. Gard. St. Petersburg.

Central China, Prov. Hupeh—Henry, n. 4908. Herb. Berlin, Barbey-Boissier, Edinburgh.

China, Patung District, Ichang—Henry, n. 4908. Herb. Bot. Gard. St. Petersburg.

Sedum elatinoides, Franchet.

Central China, Prov. Hupeh—Henry, n. 5825. Herb. Berlin, Mus. Paris, and Bot. Gard. St. Petersburg.

Central China, Prov. Hupeh—Henry, n. 4730. Herb. Edinburgh and Barbey-Boissier.

China, Prov. Hupeh—Henry, n. 6025. Herb. Bot. Gard. St. Petersburg.

China, Ichang and immediate neighbourhood—Henry, n. 3455. Herb. Berlin.

China, Ichang and immediate neighbourhood—Henry, n. 3996. Herb. Bot. Gard. St. Petersburg.

China, Patung District, Ichang—Henry. Herb. Bot. Gard. St. Petersburg.

Sedum filipes, Hemsley, var. **genuinum,** Raymond Hamet.

China, Prov. Szechwan (N. Wushan). Pale purple flowers—Henry, n. 7025. Herb. Kew, Mus. Paris, and Bot. Gard. St. Petersburg.

China, Prov. Hupeh—Henry, n. 6989A. Herb. Mus. Paris and Bot. Gard. St. Petersburg.

China, Prov. Hupeh, Ichang and immediate neighbourhood—Henry. Herb. Mus. Paris.

China, Prov. Hupeh, Ichang and immediate neighbourhood—Henry, n. 3230A. Herb. Edinburgh and Mus. Paris.

China, Prov. Hupeh, Ichang and immediate neighbourhood—Henry, n. 3230. Herb. Bot. Gard. St. Petersburg.

China, Prov. Hupeh—Henry, n. 7593. Herb. Bot. Gard. St. Petersburg.

China, Prov. Hupeh, Hsingshan—Henry, n. 6989A. Herb. Kew.

China, Prov. Hupeh, Tang, 7000 ft.—Henry, n. 6756. Herb. Kew.

Sedum filipes, Hemsley, var. **major,** Hemsley.

China, Prov. Hupeh—Henry, n. 6989. Herb. Bot. Gard. St. Petersburg.

China, Prov. Hupeh—Henry, n. 2667. Herb. Berlin.

China, Prov. Szechwan (S. Wushan)—Henry, n. 4989. Herb. Mus. Paris.

China, Prov. Szechwan (S. Wushan)—Henry, n. 6989B. Herb. Mus. Paris.

Sedum indicum, Raymond Hamet, var. **genuinum,** Raymond Hamet.

Yunnan, Mengtz, on rocks, 4500–5000 ft. Flowers green, tipped with a little red—Henry, n. 9151A. Herb. Edinburgh, Kew, Berlin, and St. Petersburg.

Yunnan, Mengtz, S. Mts., 5000 ft., on rocks—Henry, n. 9151B. Herb. Kew.

China, Ichang and immediate neighbourhood—Henry, n. 2733. Herb. Kew.

Sedum multicaule, Wallich.

Mengtz, Mts. to E., 6000 ft., on rock. Yellow flowers—Henry, n. 9157. Herb. Kew.

Mengtz, Mts., 6000 ft., on rock. Yellow flowers—Henry, n. 10,317. Herb. Kew, Edinburgh, Berlin, and Bot. Gard. St. Petersburg.

Puerh, on cliffs, 6000 ft. Yellow flowers—Henry, n. 13,197. Herb. Kew and Herb. Bot. Gard. St. Petersburg.

Sedum Rosthornianum, Diels.

China, Prov. Szechwan (S. Wushan)—Henry, n. 5727. Herb. Bot. Gard. St. Petersburg.

Sedum yunnanense, Franchet, var. **Henryi,** Raymond Hamet.

Prov. Szechwan (S. Wushan)—Henry, n. 5411C ♂. Herb. Paris, Herb. Museum Vienna, and Herb. Bot. Gard. St. Petersburg.

Prov. Szechwan (S. Wushan)—Henry, n. 5411B ♀. Herb. Paris and Herb. Bot. Gard. St. Petersburg.

Prov. Hupeh—Henry, n. 5411 ♂ in Herb. Paris and Herb. Bot. Gard. St. Petersburg; ♀ in Herb. Berlin; ♂ and ♀ in Herb. Edinburgh.

Patung District, Ichang—Henry, n. 4794 ♀ Herb. Bot. Gard. St. Petersburg.

Sedum yunnanense, Franchet, var. **valerianoides,** Raymond Hamet.

China, Yunnan, Mengtz, N. Mts., 6000 ft.—Henry, n. 10,204 ♂ in Herb. Kew., Berlin, and Edinburgh; ♀ in Herb. Bot. Gard. St. Petersburg.

VII. COLLECTION OF CONSUL-GENERAL SIR ALEXANDER HOSIE.

Sedum Chauveaudi, Raymond Hamet.

Between Tachienlu and Chentu. October 1904—Hosie. Herb. Kew.

Sedum indicum, Raymond Hamet, var. **genuinum,** Raymond Hamet.

Between Tachienlu and Chentu—Hosie. Herb. Kew.

Between Batang and Tachienlu. September–October 1904—Hosie. Herb. Kew.

Sedum Mossi, Raymond Hamet.

Between Batang and Tachienlu. September–October 1904—Hosie. Herb. Kew. Type!

VIII. COLLECTION OF REV. FATHER HUGH.

Sedum bracteatum, Diels.

N. Central China, Mt. Mo-mi-san. 1899—Rev. Fr. Hugh. Herb. British Museum.

Sedum dumulosum, Franchet.

N. Central China, Ngo-san (Lao-y-san). September 1899—Hugh. Herb. British Museum.

N. Central China, Mt. Miao-Wang-san. July 1899—Hugh. Herb. British Museum.

IX. COLLECTION OF PÈRE E. E. MAIRE.

Sedum Beauverdi, Raymond Hamet.

Yunnan, Tong Tchouan, montagnes, 2700 m., fleurs jaunes—Maire, n. 2868. Herb. Diels.

Sedum Bergeri, Raymond Hamet.

Yunnan, environs de Yun-nan-sen, rochers des pics, octobre—Maire, n. 294, 295, and 298. Herb. Edinburgh.

Sedum Celiae, Raymond Hamet.

Yunnan, Tong Tchouan, 2600 m.—Maire, n. 6735. Herb. Diels. Echantillon authentique !

Sedum Chauveaudi, Raymond Hamet.

Yunnan, Tong Tchouan—Maire, n. 6736. Herb. Diels.

Sedum drymarioides, Hance, var. **stellariaefolium,** Raymond Hamet.

Yunnan, Tong Tchouan 2600 m.—Maire, n. 3020. Herb. Diels.

Yunnan, Tong Tchouan, juillet 1910—Maire, n. 6716 *bis*. série B. Herb. Bonati.

Sedum indicum, Raymond Hamet, var. **genuinum,** Raymond Hamet.

Yunnan, rochers des rives du fleuve Polen Mong Kon, 450 m.—Maire, n. 3145. Herb. Diels.

Yunnan, environs de Yun-nan-sen ; toitures, roches basses, décembre—Maire, n. 296. Herb. Edinburgh.

Yunnan, environs de Yun-nan-sen, fleurs jaunes—Maire, n. 2371. Herb. Edinburgh.

Yunnan, environs de Yun-nan-sen—Maire, n. 976. Herb. Edinburgh.

Yunnan, Tong Tchouan, 2500 m., fleurs rouges—Maire, n. 2889. Herb. Diels.

Sedum indicum, Raymond Hamet, var. **yunnanense,** Raymond Hamet.

Yunnan, Tong Tchouan, sur les murs de la ville, fleurs blanches —Maire n. 2890. Herb. Diels.

Sedum leucocarpum, Franchet.

Yunnan, Tong Tchouan, rochers des montagnes, 2800 m., fleurs jaunes—Maire, n. 2891. Herb. Diels.

Yunnan, Tong Tchouan, 2700 m., octobre —Maire, n. 3072. Herb. Diels.

Sedum Liciae, Raymond Hamet.

Yunnan, environs de Yun-nan-sen—Maire, n. 2052 et 2276. Herb. Edinburgh.

Sedum multicaule, Wallich.

Yunnan, Tong Tchouan—Maire, n. 2892 *bis*. Herb. Diels.

Yunnan, Plaine de Tong Tchouan, 2500 m., juillet 1910—Maire, n. 6716, série B. Herb. Bonati.

Yunnan, environs de Yun-nan-sen, rochers des pics, octobre —Maire, n. 297. Herb. Edinburgh.

Yunnan, environs de Yun-nan-sen—Maire, n. 529, 977 et 2292. Herb. Edinburgh.

Sedum yunnanense, Franchet, var. **valerianoides,** Raymond Hamet.

Yunnan, Tong Tchouan, 2800 m.—Maire, n. 6290 et 6312, ♂. Herb. Diels.

X. COLLECTION OF PÈRE C. MONBEIG.

Sedum multicaule, Wallich.

Yunnan, Tsekou—Monbeig. Herb. Kew.

XI. COLLECTION OF H. B. MORSE.

Sedum multicaule, Wallich.

Lungchow in Kwangsi—Flower reddish—Morse, n. 177. Herb. Kew.

XII. COLLECTION OF A. E. PRATT.

Sedum verticillatum, Raymond Hamet.

West Szechuen and Tibetan Frontier, chiefly near Tachienlu, 9000–13,500 ft.—Pratt, n. 483. Herb. Edinburgh, Mus. Paris, Berlin, Calcutta, Bot. Gard. St. Petersburg.

Sedum yunnanense, Franchet, var. **valerianoides,** Raymond Hamet.

West Szechuen and Tibetan Frontier, chiefly near Tachienlu, 9000–13,500 ft.—Pratt, n. 468 ♀. Herb. Kew and Calcutta.

West Szechuen and Tibetan Frontier, chiefly near Tachienlu, 9000–13,500 ft.—Pratt, n. 713 ♀ Herb. Kew and Calcutta.

XIII. COLLECTION OF E. H. WILSON.

Sedum Aliciae, Raymond Hamet, var. **genuinum,** Raymond Hamet.

Western China, stone walls, etc., 3800–7500 ft. Flowers pink. August 1903—Wilson, n. 3627. Herb. Mus. Paris (Type of the species and of the variety), British Museum and Hamburg.

Sedum bracteatum, Diels.

Central China, W. Hupeh. July 1901—Wilson, n. 2500. Herb. Bot. Gard. St. Petersburg.

Sedum Costantini, Raymond Hamet.

Western China, Grosslands, Ta-tien-lu. October 1904—Wilson, n. 3634. Herb. Mus. Paris (type), British Museum, and Hamburg.

Sedum Daigremontianum, Raymond Hamet.

Western China, rocks. 7000 ft. Flowers white—Wilson, n. 3632. Herb. Mus. Paris (type), British Museum, and Hamburg.

Sedum drymarioides, Hance, var. **stellariaefolium,** Raymond Hamet.

Western China, base rocks and stony places, 12,000–14,000 ft. Flowers yellow. October 1904—Wilson, n. 3628. Herb. British Museum.

Central China, W. Hupeh. August 1901—Wilson, n. 2457. Herb. Berlin.

Sedum elatinoides, Franchet.

Central China, W. Hupeh. June 1900—Wilson, n. 1078. Herb. Berlin.

Sedum filipes, Hemsley, var. **genuinum,** Raymond Hamet.

Central China, W. Hupeh. June 1901—Wilson, n. 2571. Herb. Edinburgh, Hamburg, and Bot. Gard. St. Petersburg.

Sedum filipes, Hemsley, var. **major,** Hemsley.

Western China, Mountain Wu, rocks. Flowers white. October 1903—Wilson, n. 3618. Herb. British Museum, Hamburg, and Mus. Paris.

Sedum indicum, Raymond Hamet. var. **genuinum,** Raymond Hamet.

Western China. July 1903—Wilson, n. 3641. Herb. British Museum.

Western China, S. Wushan—Wilson, n. 2728. Herb. Kew.

Sedum Rendlei, Raymond Hamet.

Western China, base rocks, 12,500 ft. Flowers pinkish. October 1904—Wilson, n. 3619. Herb. British Museum (type).

Sedum Schoenlandi, Raymond Hamet.

Western China, arid places, 8000–9000 ft. Flowers pink. August 1903—Wilson, n. 3622. Herb. Mus. Paris (type), British Museum.

Western China, 1903–1904—Wilson. Herb. Hamburg.

Sedum Susannae, Raymond Hamet.

Western China, stony places, 10,000–12,500 ft. Flowers yellow. August 1903—Wilson, n. 3636. Herb. Mus. Paris (type), British Museum, and Hamburg.

Western China, roadside, 4000–8500 ft. August 1903—Wilson, n. 3635. Herb. British Museum.

Sedum verticillatum, Raymond Hamet.

Western China, shady rocks, 12,000–13,000 ft. July 1903—Wilson, n. 3630. Herb. British Museum.

Sedum yunnanense, Franchet, var. **Henryi,** Raymond Hamet.

Western China, Mountain Wu, wet rocks. Flowers yellow. July 1903—Wilson, n. 3616. Herb. British Museum.

Western China, S. Wushan. August 1900. Flowers yellow —Wilson, n. 650 ♂. Herb. Berlin.

Central China, W. Hupeh. June 1900—Wilson, n. 1143 ♀ in Herb. Mus Paris and Bot. Gard. St. Petersburg ; ♂ and ♀ in Herb. Edinburgh.

Sedum yunnanense, Franchet, var. **valerianoides,** Raymond Hamet.

Western China, Mountain Wu, 8000 ft. July 1903—Wilson, 3624 ♂. Herb. Mus. Paris, British Museum, and Hamburg.

COMPARATIVE TABLE.

	Bullock.	Carles.	Delavayi.	Ducloux.	Forrest. I.	Forrest II.	Hancock.	Henry.	Hosie.	Hugh.	Maire.	Monbeig.	Morse.	Pratt.	Wilson.
Sedum Aliciae, Raymond Hamet, var. genuinum, Raymond Hamet . .															*
Sedum Balfouri, Raymond Hamet					*										
Sedum Barbeyi, Raymond Hamet								*							
Sedum Beauverdi, Raymond Hamet			*		*	*					*				
Sedum Bergeri, Raymond Hamet											*				
Sedum bracteatum, Diels .					*	*		*		*					*
Sedum bupleuroides, Wallich					*	*									
Sedum Celiae, Raymond Hamet											*				
Sedum Chauveaudi, Raymond Hamet . . .			*			*			*		*				
Sedum Costantini, Raymond Hamet															*
Sedum Daigremontianum, Raymond Hamet . . .															*
Sedum Dielsi, Raymond Hamet								*							
Sedum discolor, Franchet .			*												
Sedum drymarioides, Hance, var. stellariaefolium, Raymond Hamet . . .		*			*			*			*				*
Sedum drymarioides, Hance, var. genuinum, Raymond Hamet	*	*													
Sedum dumulosum, Franchet										*					
Sedum elatinoides, Franchet								*							*
Sedum Engleri, Raymond Hamet, var. Forresti, Raymond Hamet . .					*										
Sedum fastigiatum, Hooker f. et Thomson . .					*	*									
Sedum filipes, Hemsley, var. genuinum, Raymond Hamet								*							*
Sedum filipes, Hemsley, var. major, Hemsley . .								*							*
Sedum Forrestii, Raymond Hamet					*	*									
Sedum glaciale, Franchet .			*												
Sedum indicum, Raymond Hamet, var. Forrestii, Raymond Hamet . .					*										
Sedum indicum, Raymond Hamet, var. genuinum, Raymond Hamet . .					*	*		*	*		*				*
Sedum indicum, Raymond Hamet, var. yunnanense, Raymond Hamet . . (=Crassula) yunnanensis, Franchet)			*								*				
Sedum Leblancae, Raymond Hamet . . .			*	*											

	Bullock.	Carles.	Delavayi.	Ducloux.	Forrest. I.	Forrest. II.	Hancock.	Henry.	Hosie.	Hugh.	Maire.	Monbeig.	Morse.	Pratt.	Wilson.
Sedum leucocarpum, Franchet			*								*				
Sedum linearifolium, Royle, var. Balfouri, Raymond Hamet					*	*									
Sedum linearifolium, Royle, var. Forresti, Raymond Hamet			*		*										
Sedum Liciae, Raymond Hamet											*				
Sedum Margaritae, Raymond Hamet . . .			*												
Sedum Mossi, Raymond Hamet									*						
Sedum multicaule, Wallich				*	*	*	*	*			*	*	*		
Sedum nobile, Franchet .			*		*										
Sedum obtusipetalum, Franchet (—S. mosoynense, Franchet) . . .			*		*										
Sedum Oreades, Raymond Hamet					*	*									
Sedum platysepalum, Franchet			*			*									
Sedum primuloides, Franchet			*		*	*									
Sedum Rendlei, Raymond Hamet															*
Sedum roseum, Scop, var. plur					*	*									
Sedum Rosthornianum, Diels								*							
Sedum rotundatum, Hemsley						*									
Sedum scabridum, Franchet			*		*	*									
Sedum Schoenlandi, Raymond Hamet . . .															*
Sedum Susannae, Raymond Hamet															*
Sedum tenuifolium, Franchet			*			*									
Sedum trullipetalum, Hooker, f. et Thomson . . .			*		*	*									
Sedum verticillatum, Raymond Hamet . . .														*	*
Sedum Woronowi, Raymond Hamet			*												
Sedum yunnanense, Franchet, var. Forresti, Raymond Hamet . . .					*	*									
Sedum yunnanense, Franchet, var. Henryi, Raymond Hamet . . .								*							*
Sedum yunnanense, Franchet, var. valerianoides, Raymond Hamet . .			*	*	*	*		*			*			*	*

Notes on Chinese Labiatae.

BY

STEPHEN TROYTE DUNN, B.A., F.L.S., F.R.G.S.,
Kew.

THE following list comprises descriptions of new species, reductions and transfers of old ones, and, in some cases, notes explanatory of the views expressed. Exceptional opportunities have been afforded to the writer for the revision of the *Labiatae* of China by the bringing together at Kew of a splendid series of specimens from various herbaria of this and other countries. For these facilities his thanks are specially due to Sir David Prain, the Director of the Royal Botanic Gardens, Kew, who with great kindness has borrowed for him type specimens from Paris, Christiania, Berlin, St. Petersburg, and Florence, and who has allowed all the work to be done in the herbarium of Kew.

Kew Herbarium itself possesses what is without doubt the most valuable and probably also the most extensive collection of *Labiatae* extant, containing as it does the specimens actually used and annotated by Bentham as the foundation for his classical *Labiatarum Genera et Species* (1832–1835). The specimens, moreover, on which Hemsley based his exhaustive enumeration of Chinese *Labiatae* (1890), are in the Kew herbarium. The herbarium of the Natural History Museum was also consulted by the kind permission of the Keeper.

The writer's thanks are also very specially due to Professor Balfour, Regius Keeper of the Royal Botanic Garden, Edinburgh, for entrusting to him the whole of the invaluable collections of Chinese and Japanese Labiates in the Edinburgh Herbarium (some 864 sheets), and for sending them to him at Kew to compare with the material assembled there for the work.

To Mgr. Léveillé the writer is much indebted for the courtesy with which he has lent him type specimens of the numerous newly-described plants from the province of Kweichow, a region very sparsely represented in other herbaria, besides that of the *Société International de Géographie Botanique* at Le Mans (France).

The adjustment and, it is hoped, the simplification of the existing nomenclature of Chinese Labiates, of which these notes indicate the chief points, has been undertaken to prepare the way for the preparation of keys sufficiently practical to enable botanists, and especially those collecting the living plants in China, to determine the names of their finds. The drawing up of these

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keys will be immediately proceeded with, but in the meantime the return of material to the various herbaria and the rearrangement of the series at Kew, with numerous new species and re-adjustments of names, renders it convenient to publish these notes without delay.

Ocimum aureoglandulosum, Vaniot in Bull. Acad. Géogr. Bot. xiv (1904), 171. The type in Le Mans Herb. = *Caryopteris terniflora,* Maxim.

Acrocephalus fruticosus, Dunn, sp. nov., inter alias species habitu fruticoso distinctus.

Frutex 1–2–pedalis, ramosus, tenuis. *Rami* ut folia calycesque pube brevi crispula alba dense vestiti. *Folia* oblongo-elliptica, obtusa, basi cuneata, 0.6–1.1 cm. longa, chartacea, subtus alba, supra tenuiter puberula, margine leviter crenata, venis supra impressis subtus prominentibus, petiolo 1–2 mm. longo. *Flores* in capitulis terminalibus globosis 8–9 mm. latis dispositi, sessiles, 3–4 mm. longi, bracteolis linearibus paullo longiores. *Calyx* cylindricus, 10–nervius; dentes tubo aequilongi, lanceolati. *Corolla* lilacina, calyce bis longior, subglabra; tubus latus, vix exsertus; labia tubo aequilonga; superius leviter 3–4–lobum, erectum; inferius integrum, patens. *Stamina* exserta, declinata, aequilonga; antherae loculi confluentes. *Stylus* bifidus.

YUNNAN. Valley of the Yangtze below Pung-tzu-la. Dry limestone district. Elevation 9000 ft. September 1904. *Forrest,* 582.

Orthosiphon Bodinieri, Vaniot in Bull. Acad. Géogr. Bot. xiv (1904), 170. The type in Le Mans Herb. = *Plectranthus striatus,* Benth.

O. Delavayi, Léveillé in Fedde, Repert. Nov. Sp. ix. 218. The type in Paris Herb. = *Teucrium ornatum,* Hemsl.

O. glabrescens, Vaniot in Bull. Acad. Géogr. Bot. xiv (1904), 168. The type in Le Mans Herb. = *Plectranthus striatus,* Benth.

O. marmoritis, Dunn, comb. nov. Hance under *Plectranthus.*

O. sinensis, Hemsl. in Journ. Linn. Soc. xxvi (1890), 268. The type in Kew Herb. = *Plectranthus marmoritis,* Hance (1874) = *O. marmoritis,* Dunn. The species was described under different genera by Hance and Hemsley, and although, in the opinion of the writer, the latter was correct, Hance's trivial name has priority.

Plectranthus angustifolius, Dunn, sp. nov., foliis angustis, *P. Stracheyi,* Benth., propinquat, corollae tubo brevi distinguitur.

Herba perennis, simplex vel pauciramosa, 40–80 cm. alta.

Caulis brevissime puberulus. *Folia* sessilia, oblonga vel lineari-oblonga, obtusa, basi cuneata, chartacea, scabrello-glandulosa, subglabra, supra dimidium anguste serrata. *Paniculae* terminales et rarius axillares, ad 25 cm. longae, 5 cm. latae, glanduloso-scabrellae. *Cymae* oppositae, 4–6–florae, pedunculis 15 cm. longis, bracteis lanceolatis breviter petiolatis integris 0.5 cm. longis. *Flores* 8–12 mm. longi; pedicelli graciles, calyce paullo breviores; bracteolae lineares, minutae. *Calyx* floris 2.5 mm. longus et latus; dentes erecto-patentes, tubo aequilongi, coerulescentes, aequales, acuti; in fructu 8 mm. longus, quadrate reticulatus, tubo fere bis dentibus longiore. *Corolla* purpurea, glabra, tubo basi late gibboso, labiis 3–4 mm. longis aequalibus *Nuculae* non visae.

HUPEH. Fang, *Wilson*, 2577.

YUNNAN. *Ducloux*, 274; Mengtze, grassy mountains, 5000–5500. *Henry*, 10,069, 10,069A; near Yunnan-sen, *Maire*, 2497, 2600.

P. cardiaphyllus, Hemsl. in Journ. Linn. Soc. xxvi (1890), 269. Type in Kew Herb. = *Orthosiphon debilis*, Hemsl.

P. carnosifolius, Hemsl. l.c. 270. Type in Kew Herb. is rather to be associated with *Coleus* q.v.

P. dichromophyllus, Diels in Engl. Jahrb. xxix (1901), 562. Type in Christiania Herb. = *P. rubescens*, Hemsl.

P. discolor, Dunn, sp. nov. *P. rugosae*, Wall., affinis, foliis planis haud rugosis distincta.

Frutex parvus, ramis tenuibus primo tenuiter stellato-tomentosis. *Folia* ovata, apice rotundata, basi abrupte breviter acuminata; 0.8–1.5 cm. longa, papyracea, subtus albo-stellato-tomentosa, supra glabra, integra vel majora pauci-crenata; petioli laminis bis breviores. *Flores* in cymis parvis axillaribus trifloris, 6 mm. longi, pedunculis pedicellisque 2 mm. longis. *Calyx* campanulatus, 2.5 mm. longus, 10–nervius, tenuiter tomentosus; dentes subaequales, tubo paullo breviores, lanceolati; calyx fructifer 4 mm. longus, deflexus, aliter similis. *Corolla* coerulea, paullo puberula; tubus lobis paullo longior, ima basi subito contracta, itaque gibbosa; labium superius erectum, basi contractum; inferius patens, trilobum. *Stamina* paullo exserta. *Nuculae* brunneae, laeves.

W. SZECHUEN. Min Valley, Aug. 1903, at 4–9000 ft., *Wilson*, 4321, 4322; between Tachienlu and Chengtu, October 1904, *Hosie*.

6 **P. eriocalyx,** Dunn, sp. nov., a speciebus affinibus calycibus lanatis distincta.

Herba ad 2 m. alta vel nonnunquam inferius lignosa, stolonifera, caule brevissime adpresse pubescente, rubescente. *Folia* ovata, apice gradatim, basi abrupte acuminata, 6–12 cm. longa, praeter venas subtus adpresse pubescentes glabra, serrata; petioli infra partem alatam 0.5–1.0 cm. longi. *Paniculae* saepe angustae, foliosae, terminales, 25–35 cm. longae, ramis autem inferioribus elongatis nonnunquam majis dilatatae. *Cymae* 1.5–2 cm. longae, multiflorae, pedunculis 0.5 cm. longis, bracteis lanceolatis integris pedunculis brevioribus. *Flores* 6 mm. longi; pedicelli calyce breviores; bracteolae parvae, lineares. *Calyx* campanulatus, 1.5 mm. longus, primo lanatus, tarde glabrior; dentes triangulares, acuti, tubo paullo breviores. *Corolla* lavandulacea, extus pubescens; labium superius inferiori tuboque paullo longius.

SZECHUEN. Mt. Omi, October 1904, *Wilson*, 5125.

YUNNAN. Valley of Yangtse, between Chi-tien and Chin-ho, elevation of 6–7000 ft., October 1904, *Forrest*, 587; near Yunnan-sen, *Maire*, 1599, 2024; sandy wastes on mountains near Mengtze, September 1893, 5500 ft., *Hancock*, 73; Mengtze at 4500 ft., *Henry*, 9811.

P. Esquirolii, Léveillé in Fedde, Repert. Nov. Sp. ix, 247. Type in Le Mans Herb. = *P. striatus*, Benth.

P. Gerardianus, Benth. in Wall. Pl. As. Rar. ii, 17 = *P. striatus*, Benth. l.c. The types in Kew Herb. are connected by a continuous series of gradations with regard to their distinguishing characters.

P. grosseserratus, Dunn, sp. nov. *P. excisae*, Maxim., affinis foliis sessilibus a typo distincta, floribus axillaribus cymosis, a var. *racemoso*, Dunn distincta.

Herba ramosa, 0.5 m. alta, ubique praeter corollam et genitalia pilis sparsis vestita. *Folia* late ovata, sessilia, basi abrupte in alam abeuntia, apice acuminata, 10–13 cm. longa, papyracea, grosse serrata. *Panicula* longa, angusta; cymae laxae, saepe triflorae, breviter pedunculatae, 1.5 cm. longae; inferiores breviores, superiores longiores quam bracteae. *Flores* 6–7 mm. longi; pedicelli 5 mm. longi, basi bracteolis linearibus provisi. *Calyx* late campanulatus, 4 mm. longus; tubus dentibus lanceolatis paullo brevior. *Corolla* basi subito contracta, itaque tubo gibboso; labia tubo paullo breviora; superius erectum, inferius brevius quadrilobum. *Stamina* inclusa.

SZECHUEN. Wushan, *Wilson*, 1429. Cult. in Hort. Veitch.

P. Labordei, Diels in Notes Bot. Gard. Edin. xxxi (1912), 47. Type in Edinburgh Herb. = *Elsholtzia rugulosa*, Hemsl.

P. leptobotrys, Diels in Engl. Jahrb. xxix (1901), 561. Type in Christiania Herb. = *P. Coetsa*, Don.

P. leucanthus, Diels in Notes Bot. Gard. Edin. xxv (1912), 230. Type in Edinburgh Herb. = *P. phyllopodus*, Diels.

P. leucophyllus, Dunn, sp. nov. *P. rugoso,* Wall., affinis, calycis fructiferi dentibus tubo 4-plo brevioribus distincta.

Herba mediocris, ramosa, ubique praeter florum interiora pube alba brevi densa stellata vestita, ad 1.2 m. alta. *Folia* ovata, ex basi rotundata vel obtusa, ad apicem saepe obtusam angustata, 4–5 cm. longa, chartacea, crebre crenata; petiolus 1–1.5 cm. longus. *Paniculae* longae, angustae, nonnunquam foliosae. *Cymae* densae, haud continuae, 8–10 mm. longae, foliis saepe bracteiformibus saepius superatae, breviter pedunculatae; bracteae parvae. *Flores,* staminibus exclusis, 6 mm. longi, primo subsessiles, tandem breviter pedicellati. *Calyx* cylindricus, curvatus, 4 mm. longus; tubus dentibus equalibus 4–5-plo longior. *Corolla* pallide purpurea, imo basi subito contracta, calycem paullo superans; labia tubo bis breviora, superius erectum, inferius patulum, quadrifidum. *Stamina* exserta.

SZECHUEN. Tung Valley, 1200 m., July 1903, *Wilson,* 4319; between Tachienlu and Chengtu, October 1904, *Hosie.*

P. macrocalyx, Dunn, sp. nov. *P. calcarato,* Hemsl. affinis, corolla breviter lateque calcarata distincta.

Herba magna, praeter caulem foliorum venas pedicellos corollamque brevissime puberulos glabra. *Folia* ovata, apice basique acuminata, 7–9 cm. longa, chartacea, crenato-serrata; petioli 0.5 cm. longi. *Paniculae* racemiformes, axillares, 6–10 cm. longae; cymae 3–5-florae, 2 cm. longae, bracteas lineares excedentes; pedunculus 3–5 mm. longus. *Flores* 12 mm. longi, pedicello gracili 4-plo longiores. *Calyx* sub anthesi bilabiatus horizontaliter hians, dentibus tribus superioribus alte coalitis prorsum extensis, duobus inferioribus similariter coalitis deorsum extensis, itaque bis latior quam longus, 1.5 mm. longus, 3 mm. latus, in fructu late campanulatus, 8 mm. longus, 6 mm. latus, chartaceus, 10-nervius, reticulatus; tubus 5 mm. longus, lobis obtusis apiculatis. *Corolla* cum calcare obtuso 2 mm. longo, 10 mm. longa, 2 mm. lata; labia 3–4 mm. longa; superius erectum, concavum, latum; inferius patulum, quadrifidum. *Stamina* inclusa. *Nuculae* sphaericae, atrae, 1.5 mm. latae.

CHEKIANG, *Hickin.*

FUKIEN. Foochow, 7th November 1897, *Carles,* 734.

P. marmoritis, Hance in Journ. Bot. 1874, 53. Type in Kew Herb. = *Orthosiphon marmoritis,* Dunn.

P. moslifolius, Léveillé in Fedde, Repert. Nov. Sp. ix, 247 (*sphalm.* mostifolius). Type in Le Mans Herb. = *P. nervosus,* Hemsl.

P. nudipes, Hemsl. in Journ. Linn. Soc. xxvi (1890), 272. Type in Kew Herb. is a *Hancea* q.v.

P. Prainianus, Dunn, nom. nov. Léveillé under *Hancea*.

P. racemosus, Hemsl. in Journ. Linn. Soc. xxvi (1890), 273 = *P. excisus,* Maxim., var. *racemosus,* Dunn. The series of specimens now in the Kew Herbarium does not admit of any practical demarcation between *P. racemosus,* Hemsl. and *P. excisus,* Maxim.

P. sinensis, Miq. in Journ. de Bot. Néerl. i, 115. The description does not distinguish it from the rather variable *P. amethystoides,* Benth., which is frequent in the region in which Miquel's plant was gathered.

P. Tatei, Hemsl. in Journ. Linn. Soc. xxvi (1890), 274. Type in Kew Herb. = *striatus,* Benth.

P. veronicifolius, Hance in Journ. Bot. 1885 (Nov.) 327. Type in Brit. Mus. Herb. = *P. Stracheyi,* Benth. (August 1885).

Coleus bracteatus, Dunn, sp. nov. *C. malabarico,* Benth., affinis, corollae labio superiore brevi erecto distincta.

Herba perennis, 30–40 cm. alta; caulis pauciramosa, puberula, carnosa, fragilis. *Folia* ovata, cordata, acuta, crenata, 6–8 cm. longa, subcarnosa, sparse puberula. *Petioli* laminis bis breviores vel aequilongi. *Cymae* breviter pedunculatae, distantes, bracteatae, paniculam 10–15 cm. longam, 3 cm. latam formantes; bracteae rotundatae, 1–1.5 cm. longae, integrae, sessiles. *Flores* 1–1.2 cm. longi; pedicelli ut pedunculi corollaeque puberuli. *Calyx* campanulatus, membranaceus, 2 mm. longus, subglaber; tubus dentibus aequilongus; dentes 4, subaequilongi; supremus ovatus, acutus, decurrens, in fructu reflexus; alii lanceolati, acuti. *Corolla* tubulosa, purpurea, puberula, paullo supra calycem declinata, altius subito refracta, erecta, puberula; labia tubo 6–8-plo breviora; superius erectum, concavum, intus lanatum; inferius breviter 3-lobum. *Stamina* brevia, declinata, fauci inserta brevissime cohaerentia; antherae disciformes, loculis confluentibus. *Stylus* equaliter bifidus. *Nuculae* pallidae, areola parva basilari.

YUNNAN. Szemao, W. Mountains, at 5000 ft., *Henry,* 12537; Puerh at 4500 ft., *Henry,* 13498.

C. carnosifolius, Dunn, nom. nov. Hemsley under *Plectranthus*.

C. Esquirolii, Dunn, nom. nov. (*Calamintha Esquirolii,* Léveillé in Fedde, Repert. Nov. sp. viii (1910), 450.) *Coleo atropurpureo,* Benth., affinis, tubo corollae longiore gracilioreque distincta.

Herba 30–60 cm. alta, succosissima. *Rhizoma* breve, crassum, caules paucos stolonesque graciles emittens. *Caulis* ascendens, ut folia carnosulus et brevissime puberulus. *Folia* rotundo-ovata, obtusa, basi truncata, paullo cordata, subito in petiolos acuminata, 4–6 cm. longa, grosse undulato-crenata, petiolis aequilongis. *Panicula* terminalis, 15–20 cm. longus, 4 cm. latus, cylindricus. *Verticillastri* laxi, continui, bracteis parvis caducis. *Cymae* binae, pedunculo 4–6 mm. longo ut pedicellis calycibusque glanduloso puberuloque. *Flores* 8 mm. longi; pedicelli calycibus aequilongi, bracteolis brevibus caducis. *Calyx* in anthesi fructuque membranaceus, graciliter 10–nervius, 4–5 mm. longus, tubo 3 mm. longo; dens supremus tubo circiter dimidio brevior, late triangularis, acutus; caeteri aequilongi, angusti. *Corolla* purpurea, tubo basi refracto 6 mm. longo, fauce ampliato, labiis aequilongis, 2–3 mm. longis. *Stamina* inclusa; filamenta vix coalita. *Nuculae* atrae, lucidae.

KWEICHOW. Shin-gny-hien, chemin pierreux de Sy-kouatong, November 1906, *Esquirol*, 1058 (type).

YUNNAN. Mengtze, in ravines among dry stones at 4600 ft., S.E. mountains, 6000 ft., *Henry*, 9222; on rocks in shady woods, 4600–5000 ft., *Henry*, 9222A; rocks, *Hancock*, 235.

FORMOSA. Bankinsing Mts., *Henry*, 1674.

C. wulfenioides, Diels in Notes Bot. Gard. Edin. xxv (1912), 231. Type in Edinburgh Herb. = *Orthosiphon rubicundus*, Benth.

Pogostemon Cypriani, Pamp. in Nuov. Giorn. Bot. Ital. n.s. xvii (1910), 708. Type in the Florence Herb. = *Elsholtzia communis*, Diels.

7093, **Pogostemon Dielsianus,** Dunn, sp. nov. A *P. elsholtzioidi*, Benth., floribus majoribus corollaque majis exserta; a *P. tuberculoso*, Benth., pube non stellata differt, aliter ad has species approximat.

Frutex ramosus, 1.3–2.7 m. altus, caulibus cylindricis glabris siccitate striatis. *Folia* lanceolata, apice basique gradatim acuminata, 10–14 cm. longa, chartacea, sparse strigoso-puberula, serrata; petioli infra acumen inferius laminae 0.5–1.0 cm. longi. *Paniculae* terminales, 4.0 cm. longae, foliosae, praeter corollas dense adpresse pubescentes; verticillastri continui; cymae sessiles, 5–7–florae, 1–1.5 cm. longae, bracteae ut bracteolae calycibus breviores. *Flores* sessiles, 1.25 cm. longi. *Calyx* cylindricus, 3.5–4 mm. longus, 1–1.2 mm. latus, tubo 4–5-plo dentibus acutis longiore. *Corolla* rosea, 8 mm. longa, tubo cylindrico ad faucem paullo ampliato, lobis subaequalibus. *Stamina* exserta, corollam fere bis superantia, medio lanata.

N.W. YUNNAN. Amongst scrub on dry rocky hillsides, valley of the Salwen between Shih-chi-ti and Hsia-ku-ti, Salwen-Irrawady divide. Lat. 26° 20′ N. Alt. 5–6000 ft. November 1905. *Forrest*, 875.

160 **P. nigrescens,** Dunn, sp. nov. *P. strigoso*, Benth., affinis, pube non dense strigosa distincta.

Herba annua, 1–2 pedalis, erecta, parce ramosa ; caulis praeter summum ut folia pilis sparsis laxis vestitus. *Folia* ovata, obtusa, basi breviter acuminata, 6–12 cm. longa, papyracea, bicrenata, petiolo 4-plo longiora. *Racemi* terminales, in siccitate nigrescentes, ad 10 cm. longi, 1–1.5 cm. lati ; verticillastri praeter basales contigui, infimi pauci bracteis parvis suffulti ; cymae sessiles. *Flores* cum genitalibus 5.5 mm. longi, pedicelli 1–2 mm. longi, bracteolis linearibus suffulti, ut eae calycesque rachesque racemorum pilis albis brevibus dense vestiti. *Calyx* campanulatus, 3 mm. longus, tubus dentibus linearibus 5 aequalibus bis longior. *Corolla* rubrida vel purpurea, 4 mm. longa, lobis brevibus erectis aequalibus. *Stamina* ut stylus exserta, filamentis paullo in medio hirsutis.

YUNNAN. Shady woods about Szemao and Mengtze, Henry, 9082 (Mengtze), 11,174 (Feng-chen-lin Mts.), 12,563 (Szemao).

Dysophylla Esquirolii, Léveillé in Fedde, Repert. Nov. Sp. x, 476. Type in Le Mans Herb. = *D. verticillata*, Benth.

D. Martini, Vaniot in Bull. Acad. Géogr. Bot. xiv (1904), 178. Type in Le Mans Herb. = *D. linearis*, Benth.

Elsholtzia alopecuroides, Léveillé et Vaniot in Fedde, Repert. Nov. Sp. viii (1910), 424. Type in Le Mans Herb. = *E. communis*, Diels.

E. Argyi, Léveillé in Fedde, Repert. Nov. Sp. viii (1910), 425. Type in Le Mans Herb. = *E. cristata*, Willd.

E. Cavaleriei, Léveillé et Vaniot in Fedde, Repert. Nov. Sp. viii (1910), 424. Type in Le Mans Herb. = *Leucosceptrum sinense*, Hemsl.

E. Dielsii, Léveillé l.c. ix, 218. Type in Paris Herb. = *E. polystachya*, Benth.

E. Feddei, Léveillé l.c. Type in Paris Herb. = *E. cristata*, Willd.

E. Labordei, Vaniot in Bull. Acad. Géogr. Bot. xiv (1904), 177. Type in Paris Herb. = *E. rugulosa*, Hemsl.

E. Lychnitis, Léveillé et Vaniot in Fedde, Repert. Nov. Sp. viii (1910), 425. Type in Le Mans Herb. = *Plectranthus ternifolius*, Don.

E. monostachys, Léveillé et Vaniot l.c. 424. Type in Le Mans Herb. = *Lophanthus rugosus*, Fisch. et Mey.

Elsholtzia Myosurus, Dunn, sp. nov. A speciebus affinibus fruticosis spicis caudiformibus foliisque tomentellis distincta.

Frutex aromaticus, 1–2 m. altus, caule brevissime puberulo. *Folia* sessilia, oblanceolata, acuta, basi cuneata, crebre crenato-serrata, chartacea, supra sparse et brevissime glanduloso-puberula, subtus ut calyx et corolla dense sed brevissime albo-tomentella, paullo reticulata. *Spicae* ramos terminantes, erectae, caudiformes, 10–15 cm. longae, 5 mm. latae; verticillastri praeter paucos inferiores distinctos, contingui. *Cymae* sessiles, multiflorae, compactae; bracteae bracteolaeque lineares, integrae, floribus breviores. *Flores* 3 mm. longi, sessiles. *Calyx* angustus, 2 mm. longus; tubus 1 mm. longus; dens supremus 7 mm. longus, anguste triangularis, acutus, laterales et infimi longiores, conformes. *Corolla* opace lutea, 3 mm. longa, tubo cylindrico paullo exserto, labiis brevibus 0.5 mm. longis. *Stylus* tandem longe exsertus.

YUNNAN. East flank of Tali range, in dry, open situations among scrub at 7–8000 ft. Lat. 25° 40′ N. *Forrest*, 7220. August 1910.

E. ochroleuca, Dunn. *E. blandae*, Benth., affinis, calycis dentibus brevibus in fructu apertis distincta, ab *E. polystachya*, Benth. corollis brevibus lanatis diversa.

Frutex 2–3-pedalis; caules venaeque sub foliis pilis albis vestiti. *Folia* ovata, apice obtusa, basi acuminata, 6–8 cm. longa, chartacea, subtus pallida, crenato-serrata; petioli 1–2 cm. longi. *Paniculae* angustissimae, terminales vel paniculatae, ad 12 cm. longae, 7–8 mm. latae. *Cymae* contiguae, subsessiles; bracteae minutae, lanceolatae. *Flores* 3 mm. longi, breviter pedicellati, bracteolae minutae, caducae. *Calyx* cylindricus, 1.5 mm. longus, breviter lanatus; dentes aequales, tubo bis breviores. *Corolla* ochroleuca, 2.5 mm. longa, extus paullo lanata, in labia 2 breviter lobata; superius erectum, inferius trilobatum patulum. *Genitalia* vix exserta.

YUNNAN. Mengtze at 4700 ft., *Henry*, 9136.

E. Souliei, Léveillé in Fedde, Repert. Nov. Sp. ix, 218 (non p. 248). Type in Paris Herb. = *E. cristata*, Willd.

E. Souliei, Léveillé l.c. 248 (non 218). Type in Le Mans Herb. = *E. polystachya*, Benth.

E. tristis, Léveillé et Vaniot l.c. viii (1910), 424. Type in Le Mans Herb. = *E. polystachya*, Benth.

Perilla avium, Dunn, sp. nov. A *P. nankinensi*, Decne. calycibus 1.2 cm. longis seminibusque albis distincta.

Herba magna, robusta, ramosa, ad 3 m. alta, caule hirto puberulo vel subglabro. *Folia* late ovata, acuta, basi rotundata vel breviter acuminata, 9–12 cm. longa, papyracea, praeter venis hirtulas glabra, serrata vel crenato-serrata; petioli lamina paullo breviores. *Racemi* terminales et axillares, 7–10 cm. longi, in fructu ad 20 cm. longi. *Fasciculi* 2–4-flori, oppositi; bracteae rotundatae, floribus paullo breviores. *Flores* 4 mm. longi, breviter pedicellati. *Calyx* urceolatus, basi barbatus; dentes 5, tubo aequilongi, superiores 3 medio coaliti, inferiores angusti, acuti; calyx fructiferus ad 1.4 cm. auctus, papyraceus,

fortiter 10–nervius, aliter similis. *Corolla* alba, calyx vix longior, apice breviter bilabiata, antice barbata. *Nuculae* 2.2 mm. diam. globosae, albae, alte reticulatae.

JAPAN. Cult. under name of Ygoma (fide *Savatier*); Nagasaki *Maximowicz.*

CHINA. CHILI; Peking, *Bretschneider* 577; Paushan (Peking), "Sutzu, bird seed and oil plant," October 1, 1886, *Carles*, 140.

FOKIEN. Foochow, *Carles*, 733.

YUNNAN. "S.W. China, Shu ma, seeds used in cooking," *Bourne*, 2; Salwen and Irrawady basins, lat. 25° to 27° N. at 4–7000 ft. and in Upper Burmah, grown by natives (Shans and Lissoos) for an oil which is expressed from the seeds and used for cooking, *Forrest*, 871; Yunnan-sen, *Maire* 25, 734, 2614.

P. Cavaleriei, Léveillé in Fedde, Repert. Nov. Sp. viii (1910), 425. Type in Le Mans Herb. = *P. nankinensis*, Hemsl.

Mosla Argyi, Léveillé, l.c. ix, 247. Type in Le Mans Herb. = *M. lanceolata*, Benth.

M. Fordii, Maxim. in Mél. Biol. xii, 525. The type in the Kew Herb. = *M. chinensis*, Maxim.

The latter was described from specimens which Augustinowicz gathered near Foochow, and the type specimens are in the St. Petersburg herbarium. Maximowicz afterwards received specimens of an allied form gathered by Ford in the Lo-fou-shan and described them as *M. Fordii*, relying on the silkiness of the floral bracts and their abruptly acuminate tips to distinguish them from the Foochow plant. The series of specimens in the Edinburgh herbarium together with those at Kew have now been compared with Maximowicz's type specimens, accompanied by beautiful drawings, courteously lent to Kew for the purpose, and it is clear that specific distinction should no longer be maintained between the two forms. *Carles* 725 from Foochow is about intermediate between the two types, having the silkiness of *M. Fordii*, with the bracts of *M. chinensis*.

M. punctata, Maxim. = *dianthera*, Maxim.

The writer does not hesitate to acknowledge, being in this respect in company with Hemsley, that he is unable to sort the material of *Mosla* entirely according to the proposals of Maximowicz. With the exception of the size of the bracts, which almost cover the flowers in *M. chinensis*, no constant characters have been found besides those of the seeds. The two forms here referred to (*M. punctata* and *M. dianthera*) have seeds of the same character, loosely and shallowly reticulate, and in the large series of specimens of them now collected at Kew from different herbaria no constant character can be found such as would render a specific separation useful or indeed possible.

M. soochouensis, Matsuda, must from its description be very close to, if not conspecific with, *M. dianthera*, Maxim.

Lycopus Cavaleriei, Léveillé in Fedde, Repert. Nov. Sp. viii (1910), 423. Type in Le Mans Herb. = *L. europaeus*, Linn.

Calamintha albiflora, Vaniot in Bull. Acad. Géogr. Bot. xiv (1904), 181. Type in Le Mans Herb. = *Nepeta Cataria*, L.

C. Argyi, Léveillé l.c. Type in Le Mans Herb. = *Mosla lanceolata*, Benth.

C. Cavaleriei, Léveillé l.c. 424. Type in Le Mans Herb. = *Melissa parviflora*, Benth.

C. chinensis, Benth. = *C. Clinopodium*, Benth.

Nearly all the Chinese Calaminthas belong to the group with long subulate calyx teeth, and the effort to find characters among them sufficiently constant to warrant specific differentiation has proved ineffectual, the writer being forced to the conclusion that the numerous extreme forms which have at different times received specific names can only be treated as varieties connected by a series of intermediates. The chief forms occurring in China which have received specific names are :—

(1) *C. umbrosa*, Benth. It is very common in the Talisch Mountains, where it was first distinguished as a species by Bieberstein (*Melissa umbrosa*, Bieb.). Thence its range extends through Afghanistan and the Himalayas, to the Peninsula of India and Ceylon. (2) *C. repens*, Benth., from India. (3) *C. chinensis*, Benth., from China. (4) *C. Clinopodium*, Benth. (*Clinopodium vulgare*, Linn.), from the greater part of the N. Temperate Zone.

Bentham at first placed these four species together as a section, *Clinopodium*, under *Melissa*, afterwards referring them to *Calamintha*. Hooker, in his Flora of British India, reduced them to two, *C. Clinopodium* and *C. umbrosa*, noting that they were in some states difficult to distinguish apart. The writer ventures to make a further step and place all under *C. Clinopodium*.

C. clipeata, Vaniot in Bull. Acad. Géogr. Bot. xiv (1904), 184. Type in Le Mans Herb. = *Mosla chinensis*, Maxim.

C. confinis, Hance in Journ. Bot. 1868, 331. Type in Kew Herb. = *C. gracilis*, Benth.

C. discolor, Diels in Notes Bot. Gard. Edin. xxv (1912), 232. Type in Edinburgh Herb. = *C. Clinopodium*, Benth.

C. Esquirolii, Léveillé in Fedde, Repert. Nov. Sp. viii (1910), 450. Type in Le Mans Herb. is a *Coleus*. (See *Coleus Esquirolii*, Dunn.)

C. polycephala, Van. l.c. 183. Type in Le Mans Herb. = *C. Clinopodium,* Benth.

C. radicans, Van. l.c. 182. Type in Le Mans Herb. = *C. gracilis,* Benth.

C. tsacapanensis, Léveillé l.c. 423. Type in Le Mans Herb. = *C. Clinopodium,* Benth.

C. umbrosa, Benth. in DC. Prodr. xii, 232. Type in Kew Herb. = *C. Clinopodium,* Benth.

Salvia anomala, Van. l.c. 190. Type in Le Mans Herb. = *S. miltiorrhiza,* Bunge.

S. betonicoides, Léveillé l.c. 421. Type in Le Mans Herb. = *S. japonica,* Thunb.

S. Blinii, Léveillé l.c. ix, 219. Type in Le Mans Herb. = *S. brevilabra,* Franch.

S. Bodinieri, Van. l.c. 191. Type in Le Mans Herb. = *S. yunnanensis,* C. H. Wright.

S. Cavaleriei, Léveillé in Fedde, Repert. Nov. Sp. viii (1910). 422. Type in Le Mans Herb. = *S. japonica,* Thunb.

S. Charbonnelii, Léveillé l.c. ix, 220. Type in Le Mans Herb. = *S. miltiorrhiza,* Bunge.

Salvia cynica, Dunn, sp. nov. *S. glutinosae,* L., comparabilis sed labio corollae superiore recto.

Herba perennis, 30–50 cm. alta. *Caulis* foliaque utrinque sparse scabri. *Folia* circumscriptione rotundata vel late ovata, obtuse acuminata, basi cordato-hastato, basalia 15 cm. longa, superiora minora, papyracea, conspicue bicrenata; petioli inferiorum ad 30 cm. longi, supremorum breves. *Paniculae* saepissime terminales, ad 20 cm. longae. *Flores* 3–5–nim approximati, 3.5–4 cm. longi, pedicellis 5 mm. longis; bracteae 1 cm. longae. *Calyx* anguste campanulatus, membranaceus, 1.7–2.0 cm. longus, cum partibus aliis inflorescentiae laxe puberulus; dentes breves, lati, 2–3 mm. longi, superiores 2 coaliti in unum biapiculatum; 3 inferiores ovati, apiculati. *Corolla* lutea, subglabra; tubus rectus, 1 cm. latus, labiis 3–4–plo longior; labium superius rectum, paullo concavum, inferius aequilongum, erecto-patens, trilobum, margine amborum basi revoluto flori faciem canis pugnaturi dante. *Stamina* inclusa. *Stylus* bifidus.

SZECHUEN. Ta-chien-lu, 9000–13,500 ft. *Pratt,* 71. Mt. Wu (Wushan) at 6500 ft. *Wilson,* 4342.

S. Delavayi, Léveillé in Fedde, Repert. Nov. Sp. ix, 220, Type in Paris Herb. = *S. japonica,* Thunb.

S. Esquirolii, Léveillé l.c. viii, 421. Type in Le Mans Herb. = *S. yunnanensis,* C. H. Wright.

S. Fargesii, Léveillé l.c. ix, 220. Type in Paris Herb. = *S Maximowicziana,* Hemsl.

S. flava, Forrest ex Diels in Notes Edin. Bot. Gard. xxv, 235. Type in Edinburgh Herb. = *S. Bulleyana,* Diels.

S. Forrestii, Diels l.c. 235. Type in Edinburgh Herb. = *S. campanulata,* Wall.

S. hylocharis, Diels l.c. 236. Type in Edinburgh Herb. = *S. campanulata,* Wall.

S. Mandarinorum, Diels in Engl. Jahrb. xxix, 557. Type in Christiania Herb. = *S. Przewalskii,* Maxim.

S. Marretii, Léveillé l.c. 220. Type in Le Mans Herb. = *S. tricuspis,* Franch.

S. Piazeskii, Maxim. in Mél. Biol. xi, 304. Type in St. Petersburg Herb. = *S. japonica,* Thunb.

S. Prattii, Hemsl. in Journ. Linn. Soc. xxix (1892), 316. Type in Kew Herb. = *S. hians,* Royle.

S. Prionitis, Hance in Journ. Bot. 1870, 74. Type in Kew Herb. = *S. japonica,* Thunb.

S. scapiformis, Hance l.c. 1885, 368. Type in Kew Herb. = *S. japonica,* Thunb.

S. tatsiensis, Franch in Bull. Soc. Philom. Par. sér. 8, iii, 3 (1891) 149. Type in Paris Herb. = *S. Przewalskii,* Maxim.

S. thibetica, Léveillé in Fedde, Repert. Nov. Sp. ix, 219. Type in Kew Herb. = *S. Przewalskii,* Maxim.

S. tuberifera, Léveillé l.c. viii (1910), 421. Type in Le Mans Herb. = *S. japonica,* Thunb.

Nepeta Bodinieri, Vaniot in Bull. Acad. Géogr. Bot. xiv (1904), 172. Type in Le Mans Herb. = *N. Cataria,* L.

N. coerulescens, Maxim. in Mél. Biol. xi, 306 Type in St. Petersburg Herb. is a *Dracocephalum,* q.v.

N. macrantha, Fisch. Hort. Gorenk. = *Dracocephalum sibiricum,* L.

N. Prattii, Léveillé in Fedde, Repert. Nov. Sp. ix, 245. Type in Kew Herb. = *Dracocephalum sibiricum,* L.

N. Souliei, Léveillé l.c. 221. Type in Kew Herb. = *Dracocephalum sibiricum,* L.

N. Stewartiana, Diels in Notes Bot. Gard. Edin. xxv (1912), 237. Type in Edinburgh Herb. = *Dracocephalum Stewartianum,* q.v.

N. tenuiflora, Diels. l.c. 237. Type in Edinburgh Herb. is a *Dracocephalum,* q.v.

N. Vaniotiana, Léveillé l.c. 220. Type in Le Mans Herb. = *N. lavandulacea,* L.

N. Veitchii, Duthie in Gard. Chron. 1906, ii, 334. Type in Kew Herb. is a *Dracocephalum,* q.v.

N. Wilsoni, Duthie l.c. Type in Kew Herb. is a *Dracocephalum,* q.v.

Dracocephalum bullatum, Forrest ex Diels. in Notes Bot. Gard.

Edin. xxv. (1912) 238. Type in Edinburgh Herb. = *D. speciosum*, Benth.

D. Cavalerici, Esquirolii, Kaitcheense, pinfaense and *stachydifolium*, Léveillé in Fedde, Repert. Nov. Sp. viii (1910), 442. Types in Le Mans Herb. = *D. urticifolium*, Miq.

D. coerulescens, Dunn, nom. nov. *Nepeta coerulescens*, Maxim.

D. Fargesii, Léveillé in Fedde, Repert. Nov. Sp. ix, 246. Type in Le Mans Herb. = *D. urticifolium*, Miq.

D. Henryi, Hemsl. in Journ. Linn. Soc. xxvi, 291. Type in Kew Herb. = *D. urticifolium*, Miq.

D. radicans et *D. simplex*, Van. in Bull. Acad. Géogr. Bot. xiv (1904), 179, 180. Types in Le Mans Herb. = *D. urticifolium*, Miq.

D. Stewartianum, Dunn, nom. nov. *Nepeta Stewartiana*, Diels.

D. tenuiflora, Dunn, nom. nov. *Nepeta tenuiflora*, Diels.

D. Veitchii, Dunn, nom. nov. *Nepeta Veitchii*, Duthie.

D. Wilsoni, Dunn, nom. nov. *Nepeta Wilsoni*, Duthie.

Scutellaria Cavalerici, Léveillé in Fedde, Repert. Nov. Sp. viii, 402. Type in Le Mans Herb. = *S. rivularis*, Wall.

S. Delavayi, Léveillé l.c. ix, 221. Type in Paris Herb. = *S. sessilifolia*, Hemsl.

S. Esquirolii, Léveillé l.c. viii, 402. Type in Le Mans Herb. is a *Melampyrum*.

S. formosana, N.E.Br. in Gard. Chron. 1894, ii, 22. = *S. javanica*, Jungh.

Scutellaria laxa, Dunn, sp. nov. *S. sciaphilae*, S. Moore affinis, floribus glabris, foliisque acutis distincta.

Herba decumbens, foliosa, flaccida, 20–30 cm. longa, ramos paucos axillis inferioribus emittens; caulis ut pedicelli, calyces, corollaeque parce puberulus. *Folia* oblonga, acuta, basi subcordata, 5–8 cm. longa, membranacea, pilis raris multicellularibus puberula, grosse irregulariter serrata; venae utrinque 6–8, divergentes; petioli 1 cm. longi. *Racemi* terminales, 6–10 cm. longi. *Flores* singuli, oppositi, 1.5 cm. longi; pedicelli 3–4 mm. longi; bracteæ 1–2 mm. longi, lanceolati. *Calyx* generis, 2 mm. longus. *Corolla* pallide purpurea; tubus longe exsertus, labiis 5–6-plo longior. *Stamina* inclusa.

YUNNAN. Fêng-chên-lin, 8000 ft., February 3, *Henry*, 13,771.

S. Tayloriana, Dunn, sp. nov. *S. discolori*, Colebr., affinis, corolla superne ampliata distincta.

Herba perennis, scaposa vel nonnunquam breviter caulescens.

Rhizoma parvum, radicibus longis fibrosis. *Folia* saepissime rosulam complanatam formantia, ovato-oblonga, apice rotundata, basi obtusa vel cordata, 5–7 cm. longa, papyracea, breviter hirsuta, crebre crenata; petioli sparse vel dense hirsuti, breves vel saepius laminae aequilongi. *Scapi* 10–20 cm. longi, fere ad basin floriferi, pubescentes. *Flores* bini, subsessiles, bracteis brevibus foliaceis suffulti, 1.5–1.8 cm. longi. *Calyx* generis, sub anthesi 2 mm., fructu 5 mm. longus, subglaber. *Corolla* coerulea, subglabra; tubus longe exsertus, superne dilatatus; labium superius tubo 3-plo brevius, galeatum, emarginatum, inferius aequilongum, trilobum, cum superiore limbum obliquum subaequaliter 4-lobum formans. *Stamina* inclusa.

KWANGTUNG. Tai-mo-shan, Hongkong New Territory, March 1885, *Ford*, 107.

YUNNAN, *Ducloux*, 429; Yunnan-sen, *Maire*, 1630, 2178, 2265 (fl. blues), 2294, 2531.

The plant, like most of the Chinese Scull-caps, has pretty blue flowers. Its range extends from Yunnan in S.W. China to Kwangtung in the S.E., where it grows upon Tai-mo-shan, overlooking the harbour and town of Hongkong. In its name I propose to commemorate the services to local botany of Captain Basil Taylor, R.N., Harbourmaster of Hongkong, and his wife, Harriet Osgood Taylor, the talented authoress of several works upon the artistic side of the Far East. Their companionship and support was greatly valued by the writer while Superintendent of the Botanic and Forestry Department of the Colony.

S. *tuberosa*, Vaniot in Bull. Acad. Géogr. Bot. xiv (1904), 188 = *S. amoena*, C. H. Wright.

Colquhounia decora, Diels in Notes Bot. Gard. Edin. xxv (1912), 240. Type in Edinburgh Herb. = *C. elegans*, Wall.

C. Seguini, Vaniot in Bull. Acad. Géogr. Bot. xiv (1904), 165. Type in Le Mans Herb. = *C. elegans*, Wall.

Stachys cardiophylla, Prain (*S. cordifolia*, Prain in Journ. As. Soc. Beng. lix (1890), ii, 310). Type in Kew Herb. = *S. kouyangensis*, Dunn. See below.

S. Chanetii, Léveillé in Fedde, Repert. Nov. Sp. ix, 222. Type in Le Mans Herb. = *S. chinensis*, Bunge.

S. Franchetiana, Léveillé l.c. 246. Type in Kew Herb. = *S. kouyangensis*, Dunn. See below.

S. hupehensis, Pamp. in Bull. Soc. Bot. Ital. 1911, 176. Type in Florence Herb. = *Lamium chinense*, Benth.

S. kouyangensis, Dunn, nom. nov. *Lamium kouyangense*, Vaniot in Bull. Acad. Géogr. Bot. xiv (1904), 175.

S. leptodon, Dunn, sp. nov. *S. kouyangensi*, Dunn, affinis calycis dentibus lineari-lanceolatis distincta.

Herba erecta, ad 2 ped. alta, ubique praeter corollam pilis strigosis superius densioribus et majis glanduliferis vestita. *Folia* ovato-lanceolata, acuta, basi subcordata, 5–7 cm. longa, papyracea, crenato-dentata; petioli inferiores ad 1 cm. longi, florales subnulli. *Flores* subsessiles, in spica foliata interrupta 15–25 cm. longa dispositi, bracteis foliaceis 2–3-plo breviores, 1–5 cm. longi. *Verticillastri* 6–flori, distantes. *Calyx* campanulatus, 8–9 mm. longus; tubus dentibus paullo longior, 5–nervius, ore obliquus; dentes lineari-lanceolati, acuminati. *Corolla* pallide purpurea (?), sparse pubescens; tubus cylindricus, rectus, calyci subaequilongus; labia 4 mm. longa, superius angustum, erectum, breviter concavum, inferius latius, trilobum, patens. *Stamina* sub labio superiore inclusa.

YUNNAN. Yunnansen, *Maire*, 88, 182, 1591, 2022.

S. *Martini*, Van. l.c. 187. Type in Le Mans Herb. = *S. oblongifolia*, Benth.

Lamium coronatum, Van. l.c. 174. Type in Le Mans Herb. = *Phlomis rugosa*, Benth.

L. kouyangense, Van. l.c. 175. Type in Le Mans Herb. is a *Stachys*, q.v.

Paralamium, Dunn., gen. nov. *Lamio*, Linn., comparabile, calyci distinctum.

Calyx membranaceus, campanulatus, 10–nervis; dentes 5, supremus multo latior, fructu reflexus. *Corollæ* tubus exsertus, superne in faucem ampliatus, exannulatus; labia aequilonga, superius erectum, oblongum, brevitur concavum, inferius trilobum, patens. *Stamina* 4, didynama, exteriora longiora, sub galea erecta, parallele approximata, per ciliolis cohaerentia. *Antherae* 2–loculares, loculis primo distinctis, demum confluentibus divaricatis. *Discus* aequalis. *Stylus* apice bifidus, lobis inaequalibus. *Nuculae* laeves, nitidae, compresso-triquetrae, acreola parva basilari.—Herbae erectae, foliis amplis crenatis. Flores brevipedicellati, in racemis angustis densis paniculatis dispositi.

The most striking characteristic of this plant is its calyx, which resembles those of *Orthosiphon*, *Coleus* and *Teucrium* in its broad upper tooth with recurved decurrent margins and its conspicuously veined membranous tube. The minute basal areole of its nutlet and the form of the corolla abundantly distinguish it from these genera and point to *Lamium* as its affinity.

P. gracile, Dunn, sp. nov.

Herba perennis, 40–60 cm. alta. *Caulis*, petioli, pedicellique molliter dense hirsuti. *Folia* ovato-cordata, acuminata, ad 20 cm. longa, papyracea, in venis dense, aliter sparse pubescentia; petioli laminas 3–plo breviores. *Paniculae* racemiformes, 10–15 cm. longi, 1.5 cm. latae, paniculatae. *Cymae* parvae, compactae, sessiles, contiguae. *Flores* 9 mm. longi; pedicelli 1 mm. longi; bracteae bracteolaeque minutae. *Calyx* companulatus, 3 mm. longus, pubescens; tubus dentibus bis longior, intus paucisetosus; dentes 5, 4 inferioribus lanceolatis, acutis; supremus late ovatus, truncatus, lateribus in fructu revolutis; calyx fructiferus ampliatus, membranaceus, glabrescens. *Corolla* purpurea, puberula, labiis tubo angusto 3-plo breviores. *Caetera* generis.

YUNNAN. Forests of mountains to S.E. of Mengtze, at 6000 ft. *Henry*, 10,636.

Loxocalyx Vaniotiana, Léveillé in Fedde, Repert. Nov. Sp. ix, 224. Type in Le Mans Herb. = *Phlomis rugosa*, Benth.

Leucas Acloquei, Léveillé l.c. 222. The type specimens are young, and closely resemble *Stachys oblongifolia*, Benth., in a young condition.

514 **Phlomis atropurpurea,** Dunn, sp. nov., ab affinibus foliis ovatis obtusis plerumque radicalibus distincta.

Herba perennis, 20–30 cm. alta, fere glabra. *Caulis* basi tantum foliatus, infra inflorescentiam glaber. *Folia* late ovata, apice rotundata, basi cordata, sine petiolis 6–9 cm. longa, chartacea glabra, crenata; petioli laminis longiores. *Verticillastri* plures, compacti, distantes, 5–6 cm. lati, bracteis multis linearibus setociliatis suffulti. *Flores* sessiles, 2–2.2 cm. longi, bracteolis 0. *Calyx* cylindricus, chartaceus, 1.2 cm. longus, praeter setas paucas in venis et multas in fauce glaber; dentes primarii 5, setacei, 3 mm longi, et inter eos 5, late triangulares, 1 mm. longi. *Corolla* atropurpurea (collector *dull purplish maroon* scripsit); tubus cylindricus, supra latior, prope basin annulatus; labia tubo bis breviora; superius erectum, arcuatum, margine fimbriatum, intus dense sericeum; inferius patens, trilobum. *Stamina* sub galeam inclusa.

YUNNAN. In open mountain pastures in Lat. 27° 30′ N. at 11–12,000 ft. on the eastern flank of the Lichiang Range. August 1910. *Forrest*, 6262.

P. betonicoides, Diels in Notes Bot. Gard. Edin. xxv (1912), 241. Type in Edinburgh Herb. = *P. tuberosa*, Linn.

P. melanantha, Diels in Notes Bot. Gard. Edin. xxv (1912), 242. Type in Edinburgh Herb. = *P. bracteosa*, Royle.

P. setifera, Bur. et Franch. in Journ. de Bot. v, 149. Type in Paris Herb. = *P. bracteosa*, Royle.

P. Souliei, Léveillé in Fedde, Repert. Nov. Sp. ix, 222. Type in Kew Herb. = *P. tatsiensis*, Bur. et Franch.

Microtoena Esquirolii, Léveillé, and *M. mollis*, Léveillé l.c. Types in Le Mans Herb. = *M. insuavis*, Prain.

Gomphostemma leptodon, Dunn, sp. nov. A *G. Scortechinii*, Prain inflorescentia laxiore et a *G. crinito*, Wall. dentibus calycis longioribus et latioribus distincta, aliter his affinis.

Frutex 1–1.5 m. altus, erectus, pauciramosus; caulis ut folia subtus et calyces dense stellato-tomentosa. *Folia* late ovata, acuta, subcordata, 15–18 cm. longa, chartacea, crebre eroso-dentata, supra scabrida; petioli nonnunquam dimidium foliorum superantes. *Cymae* axillares, contiguae vel distantes, 6–8 cm. longi, sessiles. *Flores* 2–2.5 cm. longi; pedicelli 8 mm. longi; bracteae lineares aequilongae. *Calyx* 1.5 cm. longus, fructu auctus, anguste campanulatus; dentes tubo tandem bis longiores, lineari-triangulares, acuminati, aequilongi. *Corolla* 2.3 cm. longa, extus puberula; tubus inferius angustus, supra dimidium inflatus, apice bilabiatus; labium superius 6 mm. longum, rotundatum, erectum; inferius aequilongum, trilobum. *Stamina* inclusa. *Nuculae* 3–4 mm. longae, opacae.

KWANGSI, Lungchow, A-chin Mts., February, *Morse*, 257.

INDO-CHINA, Tonkin, Dang-dang, among bushes, February 1886, *Balansa*, 1000.

G. microdon, Dunn, sp. nov. *G. strobilino*, Wall., affinis, dentibus calycis brevissimis distincta.

Frutex 2 m. altus. *Caulis* ut pagina inferior foliorum, bracteae calycesque stellato-tomentosus. *Folia* ovata, acuta, basi obtusa, 15–20 cm. longa, papyracea, supra scabra, crebre minute eroso-dentata; petioli 2 cm. longi. *Racemi* axillares, 10–14 cm. longi. *Flores* singuli, oppositi, approximati, bracteis parvis foliaceis suffulti, 2 cm. longi; pedicelli 2 mm. longi, ut calyces vestiti; bracteae 1.5–2.0 cm. longae, contiguae, superiores minores. *Calyx* anguste campanulatus, 5 mm. longus; dentes vix 1 mm. longi, lati. *Corolla* albo-rubra, anguste tubulosa, fauce ampliata ibique 7 mm. lata, extus puberula, bilabiata; labia tubo 4-plo breviora; superius rotundatum, erectum; inferius aequilongum, trilobum. *Stamina* inclusa. *Nuculae* 3–4 mm. longae, opacae, pauci-glandulosae.

YUNNAN. Forest west of Szemao at 4500 ft. *Henry*, 12,501.

Hancea Hemsleyana, Léveillé in Fedde, Repert. Nov. Sp. ix, 223. Type in Le Mans Herb. = *Plectranthus macranthus*, Hook. f.

H. nudipes, Dunn, nom. nov. *Plectranthus nudipes*, Hemsl.

H. Prainiana, Léveillé l.c. Type in Le Mans Herb. is a *Plectranthus* (*P. Prainianus*, Dunn).

Teucrium alborubrum, Hemsl. in Journ. Linn. Soc. xxvi (1890), 311. Type in Kew. Herb. = *T. Pernyi*, Franch. The type of *T. Pernyi*, Franch, was apparently not seen by Hemsley

before publishing the above species. Both his localities for *T. Pernyi* are given on Franchet's authority, and the note "Herb. Kew" was probably inadvertant. It is certainly not now in the Herbarium. The type now borrowed from Paris agrees exactly with Hemsley's species. It will be observed with regard to the flowers of this genus that the relative position of the side lobes to the lower lobe of the corolla changes in some species during the period between the opening and withering. The upper, middle and trifid lower lobes are in these cases at first analogous, but later by the drawing forward of the middle or side lobes the appearance is produced of a bilabiate corolla with a pinnatifid lower lobe.

T. Franchetianum, Diels in Engl. Jahrb. xxix (1901), 551. Type in Christiania Herb. = *T. ornatum,* Hemsl.

T. fulvo-aureum, Léveillé in Fedde, Repert. Nov. Sp. viii (1910), 426. Type in Le Mans Herb. = *T. quadrifarium,* Buch.-Ham.

T. kouytchense, Léveillé l.c. 450. Type in Le Mans Herb. = *T. quadrifarium,* Buch.-Ham.

T. nepetoides, Léveillé l.c. 450. Type in Le Mans Herb. = *T. japonicum,* Willd.

T. ningpoense, Hemsl. in Journ. Linn. Soc. xxvi (1890), 313. Type in Kew Herb. = *T. Pernyi,* Franch.

Leucosceptrum Bodinieri, Léveillé in Fedde, Repert. Nov. Sp. ix, 224 = *L. sinense,* Hemsl.

Ajuga Chaneti, Léveillé et Vaniot in Fedde, Repert. Nov. Sp. viii (1910), 258 = *A. ciliata,* Bunge.

A. Labordei, Vaniot in Bull. Acad. Géogr. Bot. xiv (1904), 185 = *A. genevensis,* Linn.

Vol. VIII. Number XXXVIII

NOTES
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CONTENTS.

	Page
Diagnoses specierum novarum in herbario Horti Regii Botanici Edinburgensis cognitarum. (Species chinenses.) LI–CII.	173
Three Indo-Burmese Rhododendrons. (With Plates CXXXIX–CXLI.) By J. H. Lace and W. W. Smith, M.A.	213
Puccinia Prostii, Moug., and Uromyces Scillarum, Wint.—Two Rust Fungi from the Royal Botanic Garden, Edinburgh. (With Plates CXLII–CXLIII.) By Malcolm Wilson, D.Sc., F.L.S.	219
Aeschynanthus chorisepala, Orr. A new Chinese species; with an account of fissuring of its leaves. (With Plate CXLIV.) By Matthew Young Orr.	223
Ustilago Vaillantii, Tul., on Chionodoxa Luciliae, Boiss. (With One Text-figure.) By R. C. Davie, M.A., B.Sc., and Malcolm Wilson, D.Sc., F.L.S.	227

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DIAGNOSES

Specierum novarum in herbario Horti Regii Botanici Edinburgensis cognitarum.

LI–CII.

[Species chinenses.]

The species described in this series are :—

Adenophora Watsoni, W. W. Sm., p. 175.
Ainsliaea fulvipes, J. F. Jeffrey et W. W. Sm., p. 175.
Allium Beesianum, W. W. Sm., p. 176.
Arisaema auriculatum, W. W. Sm., p. 177.
Arisaema lichiangense, W. W. Sm., p. 178.
Buddleia caryopteridifolia, W. W. Sm., p. 179.
Buddleia eremophila, W. W. Sm., p. 179.
Buddleia incompta, W. W. Sm., p. 180.
Caragana oreophila, W. W. Sm., p. 181.
Cassiope palpebrata, W. W. Sm., p. 182.
Chimonanthus yunnanensis, W. W. Sm., p. 182.
Clematis Forrestii, W. W. Sm., p. 183.
Corydalis calcicola, W. W. Sm., p. 184.
Cremanthodium comptum, W. W. Sm., p. 184.
Daphne calcicola, W. W. Sm., p. 185.
Dracocephalum Isabellae, G. Forrest, p. 211.
Erysimum bracteatum, W. W. Sm., p. 185.
Gaultheria suborbicularis, W. W. Sm., p. 186.
Gentiana Beesiana, W. W. Sm., p. 187.
Gentiana scabratopes, W. W. Sm., p. 187.
Gymnadenia calcicola, W. W. Sm., p. 188.
Habenaria Beesiana, W. W. Sm., p. 189.
Illigera grandiflora, W. W. Sm. et J. F. Jeffrey, p. 189.
Impatiens nubigena, W. W. Sm., p. 190.
Kingdonia uniflora, Balf. f. et W. W. Sm., p. 191.
Lilium Forrestii, W. W. Sm., p. 192.
Marsdenia oreophila, W. W. Sm., p. 193.
Orchis Beesiana, W. W. Sm., p. 193.
Ostryopsis nobilis, Balf. f. et W. W. Sm., p. 194.
Parrya Forrestii, W. W. Sm., p. 195.
Pertya monocephala, W. W. Sm., p. 212.
Phyllanthus Forrestii, W. W. Sm., p. 195.
Pieris Forrestii, Harrow, p. 196.
Polygonum lichiangense, W. W. Sm., p. 197.
Porana decora, W. W. Sm., p. 197.
Potentilla Forrestii, W. W. Sm., p. 198.
Potentilla taliensis, W. W. Sm., p. 199.
Randia lichiangensis, W. W. Sm., p. 200.

[Notes, R.B.G., Edin., No. XXXVIII, Sept. 1914.] A
Wt 23/599—450—12/14.—N. & Co., Ltd. Gp. 10.

Rhododendron cuneatum, W. W. Sm., p. 200.
Rhododendron oreotrephes, W. W. Sm., p. 201.
Rhododendron prostratum, W. W. Sm., p. 202.
Rhododendron rupicolum, W. W. Sm., p. 203.
Rhododendron Traillianum, G. Forrest et W. W. Sm., p. 204.
Rhododendron Wardii, W. W. Sm., p. 205.
Saussurea bullata, W. W. Sm., p. 206.
Sonerila yunnanensis, J. F. Jeffrey, p. 207.
Strobilanthes Dielsiana, W. W. Sm., p. 207.
Styrax langkongensis, W. W. Sm., p. 208.
Tovaria Forrestii, W. W. Sm., p. 209.
Tovaria lichiangensis, W. W. Sm., p. 209.
Trachydium spatuliferum, W. W. Sm., p. 210.
Vaccinium modestum, W. W. Sm., p. 210.

The species fall into the following natural orders :—

ACANTHACEAE : Strobilanthes Dielsiana, W. W. Sm., p. 207.
AROIDEAE : Arisaema auriculatum, W. W. Sm., p. 177.
Arisaema lichiangense, W. W. Sm., p. 178.
ASCLEPIADEAE : Marsdenia oreophila, W. W. Sm., p. 193.
BETULACEAE : Ostryopsis nobilis, Balf. f. et W. W. Sm., p. 194.
CALYCANTHACEAE : Chimonanthus yunnanensis, W. W. Sm., p. 182.
CAMPANULACEAE : Adenophora Watsoni, W. W. Sm., p. 175.
COMBRETACEAE: Illigera grandiflora, W. W. Sm. et J. F. Jeffrey, p. 189.
COMPOSITAE : Ainsliaea fulvipes, J. F. Jeffrey et W. W. Sm., p. 175.
Cremanthodium comptum, W. W. Sm., p. 184.
Pertya monocephala, W. W. Sm., p. 212.
Saussurea bullata, W. W. Sm., p. 206.
CONVOLVULACEAE : Porana decora, W. W. Sm., p. 197.
CRUCIFERAE : Erysimum bracteatum, W. W. Sm., p. 185.
Parrya Forrestii, W. W. Sm., p. 195.
ERICACEAE : Cassiope palpebrata, W. W. Sm., p. 182.
Gaultheria suborbicularis, W. W. Sm., p. 186.
Pieris Forrestii, Harrow, p. 196.
Rhododendron cuneatum, W. W. Sm., p. 200.
R. oreotrephes, W. W. Sm., p. 201.
R. prostratum, W. W. Sm., p. 202.
R. rupicolum, W. W. Sm., p. 203.
R. Traillianum, G. Forrest et W. W. Sm., p. 204.
R. Wardii, W. W. Sm., p. 205.
EUPHORBIACEAE : Phyllanthus Forrestii, W. W. Sm., p. 195.
GENTIANACEAE : Gentiana Beesiana, W. W. Sm., p. 187.
C. scabratopes, W. W. Sm., p. 187.
GERANIACEAE : Impatiens nubigena, W. W. Sm., p. 190.
LABIATAE : Dracocephalum Isabellae, G. Forrest, p. 211.
LEGUMINOSAE : Caragana oreophila, W. W. Sm., p. 181.
LILIACEAE : Allium Beesianum, W. W. Sm., p. 176.
Lilium Forrestii, W. W. Sm., p. 192.
Tovaria Forrestii, W. W. Sm., p. 209.
T. lichiangensis, W. W. Sm., p. 209.
LOGANIACEAE : Buddleia caryopteridifolia, W. W. Sm., p. 179.
B. eremophila, W. W. Sm., p. 179.
B. incompta, W. W. Sm., p. 180.
MELASTOMACEAE : Sonerila yunnanensis, J. F. Jeffrey, p. 207.

Orchideae: Gymnadenia calcicola, W. W. Sm., p. 188.
Habenaria Beesiana, W. W. Sm., p. 189.
Orchis Beesiana, W. W. Sm., p. 193.
Papaveraceae: Corydalis calcicola, W. W. Sm., p. 184.
Polygonaceae: Polygonum lichiangense, W. W. Sm., p. 197.
Ranunculaceae: Clematis Forrestii, W. W. Sm., p. 183.
Kingdonia uniflora, Balf. f. et W. W. Sm., p. 191.
Rosaceae: Potentilla Forrestii, W. W. Sm., p. 198.
P. taliensis, W. W. Sm., p. 199.
Rubiaceae: Randia lichiangensis, W. W. Sm., p. 200.
Styraceae: Styrax langkongensis, W. W. Sm., p. 208.
Thymeleaceae: Daphne calcicola, W. W. Sm., p. 185.
Umbelliferae: Trachydium spatuliferum, W. W. Sm., p. 210.
Vacciniaceae: Vaccinium modestum, W. W. Sm., p. 210.

Adenophora Watsoni, W. W. Sm. Sp. nov.

Species inter congeneres foliis late obovatis truncatis conspicua.

Planta 40–60 cm. alta, erecta, robusta, simplex nisi in regione inflorescentiae, in medio bene foliata basi fere nuda, striata, minute villosula, infra glabrescens. Folia alterna, 3–4 cm. longa, 3–3.5 cm. lata, perlate obovata, truncata, in medio marginis superioris brevius acuminata, basi rotundata, margine remotius sinuato-dentata, subcoriacea, supra atroviridia glabra vel subglabra, infra pallidiora sparse minute villosula praesertim in venulis; nervi secundarii supra obscuri paululo impressi, infra distincti paulo elevati; petiolus fere nullus vel ad 2 mm. longus. Paniculae amplae 20–30 cm. longae villosulae; rami ascendentes, basi longiuscule nudi, in parte superiore remotius floriferi; flores saepius solitarii, nonnunquam bini, nutantes; pedicelli 2–4 mm. longi, villosuli, bracteolis brevibus linearibus praediti. Receptaculum circ. 4 mm. longum, dense villosulum; dentes calycini circ. 3 mm. longi, lineares vel anguste lanceolati, acuti, villosuli vel glabrescentes. Corolla 1.7–2 cm. longa, ore circ. 2 cm. lata, infundibuliformis, coerulea; limbi lobi 7–8 mm. longi, triangulares. Stamina e basi dilatata antheris circ. 6 mm. longis filamentum fere aequantibus. Discus circ. 2 mm. longus cylindricus glaber. Stylus vix corollam aequans, pubescens.

Central China:—Grown from seeds collected near Tatsienlu by Mr Charles Marson Watson in 1908. Among the species of *Adenophora* centering round *Adenophora polymorpha*, Ledeb., this new species is distinguished by the peculiar truncate leaves.

Ainsliaea fulvipes, J. F. Jeffrey et W. W. Sm.

Species affinis *A. undulatae*, Diels ex descriptione; ab illa specie et ab *A. Henryi*, Diels acheniis hirsutis inter alia differt.

Planta 20–45 cm. alta, gracilis, rhizomate longo crasso vestigiis praeteritorum foliorum dense vestito, apice setis longis fulvis copiose ornato. Caulis solitarius flexuosus basi foliatus, primo densius fulvo-setosus deinde subglabrescens. Folia omnia vel fere omnia radicalia, petiolis 2–7 cm. longis setis longis fulvis patentibus dense obsitis ; lamina 3–6 cm. longa, 1.5–2.5 cm. lata, elliptica, apice rotundata vel obtusa, basi rotundata vel subrotundata, subcoriacea, margine remote indurato-apiculato-denticulata, supra atro-viridis primo longiuscule fulvo-setosa, deinde glabrescens, infra pallidior densius fulvo-setosa, nervis 3–4 utrinque abeuntibus supra obscuris infra paulo prominulis ; folia caulina nulla vel 1–2 minuta bracteiformia. Capitula solitaria remota vel 2–3-fasciculata, spicam 7–16 cm. longam interruptam angustissimam formantia, 2–3-flora, vix 1 cm. longa. Involucri phylla exteriora brevia rubrida, interiora elongata lanceolata acuminata subpaleacea. Pappi setae uniseriatae 6 mm. longae fulvae. Achaenium circ. 1 mm. longum dense pilosum.

Yunnan :—Near Teng-yueh, Howell No. 252. *Type*.

Yunnan :—" Plant of 9–18 inches. Flowers pale rose. Dry shady situations on rocks in the hills to the north of Teng-yueh. Lat. 25° 15′ N. Alt. 7000 ft. May 1912." G. Forrest. No. 7862.

6667 **Allium Beesianum,** W. W. Sm. Sp. nov.

Species ex affinitate *Allii cyanei*, Regel et *Allii kansuensis*, Regel ; ab hoc floribus majoribus, filamentis ecuspidatis, stylo ovario 2–3-plo longiore differt, ab illo floribus duplo majoribus, segmentis perianthii elliptico-oblongis, staminibus inclusis recedit.

Bulbi caespitosi, angusti, cylindrici, basi rhizomata filiformia horizontalia emittentes, tunicis tandem fibrosis praediti. Caulis erectus 30–45 cm. altus, teres, a basi usque ad medium foliatus. Folia 1–3, canaliculata, deinde plana, 10–25 cm. longa, 4–8 mm. lata, linearia, subobtusa, margine minutissime scabra. Scapus gracilis apice nutans. Spatha membranacea univalvis ovata apiculata mox decidua. Umbella 5–10-flora, hemisphaerica, pedicellis subaequalibus, quam flores vix brevioribus, basi nudis. Perianthii campanulato-tubulosi clare cyanei segmenta elliptico-oblonga, obtusa, ad 13 mm. longa, ad 4 mm. lata, exteriora interioribus paulo breviora. Stamina exteriora perianthium fere aequantia, interiora circiter $\frac{1}{5}$ breviora ; filamenta cyanea, basi dilatata ecuspidata. Ovarium trigonum minute papillosum ; stylus cyaneus ovario 2–3-plo longior, perianthium fere superans.

"Plant of 9–18 inches. Flowers pendulous, bright blue, striped a deeper shade. Open stony pasture on the eastern flank of the Lichiang Range. Lat. 27° 35′ N. Alt. 12,000 ft. Sept. 1910." G. Forrest. No. 6576. *Type.*

"Open boggy grassland on the Chung Tien plateau six miles south of town. Alt. 12,000 ft. September 1904." G. Forrest. No. 253.

"Plant of 9–14 inches. Flowers deep rich blue, with the segments of perianth pure white. Open mountain meadows on the eastern flank of the Lichiang Range. Lat. 27° 20′ N. Alt. 12,000–13,000 ft. September 1906." G. Forrest. No. 3029.

Arisaema auriculatum W. W. Sm. Sp. nov.

Species affinis *A. nepenthoidi* (Wall.) Mart. inflorescentia simillima sed foliis trifoliolatis.

Planta 30–60 cm. alta, basi squamis foliaceis pluribus tenuiter membranaceis purpureo-striatis induta. Folia duo, petiolo 8–12 cm. longo vagina membranacea instructa ; lamina trisecta, segmentis lateralibus sessilibus, intermedium subaequantibus vel paulo superantibus, basi valde inaequilateralibus, omnibus longe acuminatis basi cuneatis vel rotundatis, 8–12 cm. longis 3–6 cm. latis, lanceolatis vel ovatis, nervis supra obscuris, infra distinctis eminentibus ; segmentum intermedium nunc sessile nunc ad 3 cm. petiolulatum. Pedunculus petiolum plus minusve aequans. Spatha lurido-purpurea, ad apicem viridis, usque ad 13 cm. longa ; tubus cylindricus, ad 6 cm. longus, basi 1 cm. superne 2 cm. latus ; lamina late ovata, circ. 7 cm. longa, medio 5 cm. lata, basi paulo contracta, apice breviter acuminata, basi utrinque in auriculam amplam circ. 3 cm. longam rotundatam recurvam dilatata. Inflorescentiae masculinae pars antherifera circ. 3 cm. longa ; pars superior circ. 4 cm. longa, breviter ad 5 mm. stipitata, exserta, erecta, cylindracea, obtusa, ei *A. nepenthoidis* simillima. Ovaria inflorescentiae femininae arcte conferta.

"Plant of 1–2 ft. Spathe livid maroon, greenish towards tip. Pasture on the margins of pine forests on the eastern flank of the Tali Range. Lat. 25° 40′ N. Alt. 8000–10,000 ft. July–August 1910." G. Forrest. No. 7261. ♂. *Type.*

"Plant of 12–15 inches. Spathe livid green veined and netted purplish red. In mixed forests on the eastern flank of the Tali Range. Lat. 25° 40′ N. Alt. 8000–10,000 ft. August 1910." G. Forrest. No. 7260. ♂ and ♀.

"Plant of 1–2 ft. Inflorescence deep reddish purple, spathe same, spotted a deeper shade. Damp pine forests on the eastern flank of the Tali Range. Lat. 25° 40′ N. Alt. 9000–10,000 ft. July 1906." G. Forrest. No. 4851.

Very near to the Himalayan species *Arisaema nepenthoides* (Wall.) Mart., but with trifoliolate leaves, and various minor differences in the spathe. No. 4851 was referred in Notes Roy. Bot. Gard. Edinb., vol. vii, p. 276, to *Arisaema nepenthoides* (Wall.) Mart. The leaves of that specimen are scarcely developed.

Arisaema lichiangense, W. W. Sm. Sp. nov.

Species affinis *Arisaemati ringenti*, Schott; proxima *A. talensi*, Engl. MSS. (in Herb. Berol. et Herb. Edinb.) sed foliolis latissimis, spatha majore latiore auriculata purpurea luteo-striata recedit.

Planta 20–30 cm. alta. Tuber subrotundum 3–4·5 cm. diametro, fibris multis praeditum. Folium solitarium, petiolo 20–24 cm. longo, basi squamis foliaceis (plerumque duabus) 6–12 cm. longis, ellipticis, tenuiter membranaceis purpureo-maculatis instructum; lamina trisecta segmentis sessilibus (vel intermedio fere sessili) 4–9 cm. longis, 3–9 cm. latis, latissime ovatis vel suborbicularibus, apice breviter et abrupte acuminatis, basi late cuneatis vel rotundatis, integris, nervis reticulatis subtus paulo distinctioribus; segmentis lateralibus intermedio paulo minoribus, basi nunc aequilateralibus nunc valde inaequilateralibus. Pedunculus petiolum plus minusve aequans. Spatha purpurea, luteo-striata, apice longe acuminata inclusa 7–10 cm. longa, in sicco 1.2–1.8 cm. lata, lamina late ovata, e tubo abrupte ampliata, basi breviter auriculata, intus pulchre luteo- et purpureo-marmorata. Inflorescentiae masculinae pars antherifera circ. 1.5 cm. longa; pars superior circ. 5 cm. longa, caudiformis apice subacuta, deflexa, nigrescens. Flores feminini desunt.

"Plant of 9–12 inches. Spathe purple, striped yellow. Dry open situations amongst pine scrub on the eastern flank of the Lichiang Range. Lat. 27° 30′ N. Alt. 9000–10,500 ft. June 1910." G. Forrest. No. 5972. *Type.*

"Plant of 9–12 inches. Spathe purple, striped green. Open situations on the margins of pine forests on the eastern flank of the Lichiang Range. Lat. 27° 20′ N. Alt. 9000–11,000 ft. June 1910." G. Forrest. No. 5797.

The species is closely akin to Forrest No. 4849, *Arisaema talense*, Engl. var. *latisectum*, Engl. (adhuc nomen), but with much broader leaflets and a different spathe. The appendix of the male flower is quite that of *Arisaema talense*, Engl. in Forrest No. 2465.

Buddleia caryopteridifolia, W. W. Sm. Sp. nov.

Inter species chinenses descriptas primo intuitu foliorum forma et aspectu conspicua.

Frutex ramosus 150–180 cm. altus ramulis robustis subteretibus bene foliatis dense incano-stellato-tomentosis, vetustis decorticantibus. Folia opposita petiolo 5–10 mm. longo anguste alato incano-stellato-tomentoso praedita, plerumque 4–6 cm. longa, 3–4 cm. lata, ovata vel oblonga, apice rotundata vel obtusa, basi inaequalia latissime cuneata vel subtruncata vel subrotundata, grosse subirregulariter crenato-dentata, supra subincana, stellato-tomentosa, infra pallidiora dense incano-stellato-tomentosa, nervis supra subobscuris infra conspicuis pulchre reticulatis. Cymulae in paniculam terminalem angustissimam 4–8 cm. longam confertae; pedunculus 2–3 cm. longus vel fere nullus; pedicelli fere nulli; bracteae nunc conspicuissimae 2 cm. longae, lineari-lanceolatae incano-tomentosae, nunc multo minores. Calyx tubulosus circ. 3 mm. longus, extus dense incano-stellato-tomentosus, intus glaber dentibus 1 mm. longis subulatis. Corollae lavendulaceae tubus 6–7 mm. longus, circ. 1.5 mm. latus, extus dense incano-tomentosus, intus sparse pilosulus; lobi rotundati circ. 2 mm. diametro, extus incano-tomentosi intus marginem versus glabri, faucibus ± pilosuli. Stamina in medio tubo inserta. Ovarium albo-tomentosum. Fructus deest.

"Shrub of 5–6 ft. Flowers pale lavender. Open situations on the Tong Shan in the Yangtze bend. Lat. 27° 20′ N. Alt. 10,000 ft. Sept. 1913." G. Forrest. No. 11,016.

Buddleia eremophila, W. W. Sm. Sp. nov.

Species ex affinitate *B. nanae,* W. W. Sm., eadem magnitudine habituque sed foliis crenato-serratis subtus incanis primo intuitu discrepat.

Fruticulus ramosus 30–60 cm. altus, ex collectore compactus, ramulis gracillimis teretibus primo dense incano-stellato-tomentosis, senioribus mox glabrescentibus et defoliatis, tandem decorticantibus. Folia opposita petiolo 2–3 mm. longo dense incano-stellato-tomentoso praedita, 1–1.5 cm. longa, 5–8 mm. lata, ovata vel lanceolato-ovata, apice obtusa, basi late cuneata vel subrotundata, distincte crenato-serrata serraturis utrinque 3–4, supra pallido-viridia dense stellato-tomentosa, infra dense incano-stellato-tomentosa, nervis 3–4-paribus supra immersis infra eminentibus. Inflorescentiae pro genere brevissimae, plerumque 3–7-florae; flores parvi, apice ramulorum fere capitati; pedicelli vix 1 mm. longi, incano-tomentosi; bracteae 2–3 mm. longae, lineares incano-tomentosae. Calyx tubulosus 4–5 mm. longus, tubo corollae adpressus, extus dense incano-stellato-tomentosus, intus glaber, dentibus linearibus 1 mm. longis. Corollae (lavandulaceae ?) tubus circ. 8 mm. longus, 1.5 mm. latus, extus stellato-tomentosus; lobi rotundati circ. 1.5 mm. diametro, intus glabri. Stamina in medio tubo inserta. Ovarium tomentosum; fructus maturus 4–5 mm. longus ovoideus glabrescens brunneus.

"China:—Western Yunnan, arid regions above the Yangtze. Alt. 10,000 ft. Compact dwarf shrub of 1–2 ft. May 1913." F. Kingdon Ward. No. 304.

This species is at once distinguished by its dwarf habit, its very slender branches and few-flowered inflorescence; it is nearest to *Buddleia nana*, W. W. Sm., and of still slenderer form.

Buddleia incompta, W. W. Sm. Sp. nov.

Species affinis *B. heliophilae*, W. W. Sm. sed foliis minoribus obtuse dentatis inter alia recedit; a *B. eremophila* supra descripta foliis majoribus, corolla extus nitenti-glandulosa inter alia signa differt.

Frutex ramosus 90–180 cm. altus, ex collectore incomptus, ramulis robustioribus subteretibus, primo ± dense incano-stellato-tomentosis, senioribus glabrescentibus. Folia opposita petiolo ± 1 cm. longo alato dense incano-stellato-tomentoso praedita, 2–3 cm. longa, 1–1.5 cm. lata, ovato-elliptica, apice obtusissima vel subrotundata, basi saepius cuneatim in petiolum angustata rarius subtruncata, saepius dentata denticulis utrinque 8–10, rarius obscure undulato-denticulata, supra subincano-stellato-tomentosa, infra dense incano-stellato-tomentosa, nervis 6–7-paribus supra immersis infra eminentibus. Cymulae in paniculam terminalem angustam 4–6 cm. longam confertae; pedunculi brevissimi, pedicelli fere nulli, bracteae 3–8 mm. longae, incano-tomentosae. Calyx tubulosus circ. 4 mm. longus, tubo corollae adpressus, extus dense incano-stellato-tomentosus, intus glaber dentibus 1 mm. longis sublinearibus obtusiusculis. Corollae tubus circ. 8 mm. longus, circ. 1.5 mm. latus, extus sparsius tomentosus, hinc inde glaber, ± dense glandulis nitentibus conspersus; lobi rotundati circ. 3 mm. diametro, extus nitenti-glandulosi, nonnunquam subglabri, intus glabri. Stamina in medio tubo inserta. Ovarium albo-tomentosum. Fructus deest.

"China:—Western Yunnan in the A-tun-tsi valley at about 11,000 ft., on dry rocks and exposed hillsides. Untidy bush of 3–6 ft.; leaves silver in spring, golden in autumn. June 1913." F. Kingdon Ward. No. 345. *Type.*

"China:—Western Yunnan in Mekong Valley. Untidy shrub of 4–5 ft. June 1913." F. Kingdon Ward. No. 313.

This is, I believe, the same species; the inflorescence is less dense, the flowers 1 cm. long, calyx more tomentose.

Caragana oreophila, W. W. Sm. Sp. nov.

Species valde affinis *C. Franchetianae*, Kom. a qua habitu humiliore, ramis foliisque dense albo-villosis haud glabrescentibus floribus paulo minoribus inter alia satis recedit.

Frutex erectus ramosus 60–120 cm. altus ramis erectis elongatis crassiusculis junioribus densissime molliter albido-villosis senioribus nigrescentibus haud glabrescentibus. Petioli vetusti indurati patentissimi robusti 2.5–3 cm. longi, nudi spinoso-mucronati, apice excepta dense villosuli; stipulae 4–5 mm. longae ovatae scariosae margine albo-ciliatae, mox emarcidae. Folia 3–3.5 cm. longa, plerumque 8-juga jugis ± approximatis, rhachide dense longiuscule albo-villosa mucrone longo glabro praedita; foliola 6–7 mm. longa, circ. 2 mm. lata, oblonga, mucronulata, utraque facie dense subadpresse albo-villosa. Pedunculi uniflori nunc vix 1.5 mm. longi, nunc pedicellos aequantes, albo-villosi, bractea lineari circ. 5 mm. longa scariosa praediti; pedicelli plerumque 7–8 mm. longi, albo-villosi, bracteolis duabus linearibus 4–5 mm. longis scariosis nunc supra medium affixis nunc prope calycem suppositis. Calyx tubulosus 11–12 mm. longus longiuscule albo-villosus, dentibus lanceolatis acuminatis subspinescentibus tubum ± aequantibus. Corolla aurantiaca brunneo-suffusa fere 2 cm. longa, vexillo circ. 1.8 cm. longo late obovato longe unguiculato plicato, alarum auricula lineari ungui fere aequali circ. 4.5 mm. longa, carina circ. 1.4 cm. longa apice rotundata basi auricula dentiformi instructa. Ovarium elongatum dense albo-villoso-lanatum; legumen circ. 2.2 cm. longum extus dense lanatum, intus indumento fulvido farctum, seminibus oblongis.

"Spinous shrub of 2–4 ft. Flowers orange and brown. Open alpine pasture on the mountains in the north-east of the Yangtze bend. Lat. 27° 45′ N. Alt. 12,000 ft. July 1913." G. Forrest. No. 10,331.

In some specimens the peduncle is so short that at the first examination affinity with the section *Jubatae* is suggested. However, in habit, in the number of leaflets, in the bracteoles and floral structure, it is a close ally of *C. Franchetiana*, Kom., also collected by Forrest in the neighbouring Lichiang Range.

Cassiope palpebrata, W. W. Sm. Sp. nov.

Species ex affinitate *C. selaginoidis*, Hook. f. et Thoms. sed foliis ± patentibus, vix imbricatis, longiuscule setoso-ciliatis, filamentis villosulis inter alia facile distinguitur.

Fruticulus humilis 6–8 cm. altus, suberectus vel decumbens. Folia 2–4 mm. longa, circ. 1 mm. lata, lanceolata vel subelliptica apice subobtusa basi cuneata rigida, ± patentia, conferta sed vix imbricata, coriacea, margine incrassata et setis utrinque 3–4 circ. 1 mm. longis praedita, caeterum glabra nitentia. Flores axillares cernui albidi pedicellis gracilibus circ. 2 cm. longis abrupte (fere recto angulo) abeuntibus dense araneoso-fulvido-villosis suffulti. Sepala 5, libera, 2 mm. longa, elliptica vel ovata, apice rotundata vel obtusa, laete rubro-purpurea, glabra. Corolla campanulata 7–8 mm. longa lobis ovatis 2 mm. longis obtusis. Stamina 8 (in specimine dissecto) inclusa filamentis 2 mm. longis subulatis sparsius villosulis, antheris ovoideis apice aristis duabus elongatis ornatis. Stylus 2 mm. longus columnaris. Fructus maturus deest.

"China:—In Western Yunnan on the Mekong-Yangtze divide, on granite screes and precipices at an elevation of 13,000–14,000 ft. June 1913." F. Kingdon Ward. No. 583 in Herb. Edin.

A very graceful species differing from the allied Himalayan species in the foliage.

Chimonanthus yunnanensis, W. W. Sm. Sp. nov.

Species affinis *Chimonantho fragranti*, Lindl.; foliis ovatis basi rotundatis, apice non acuminatis, foliis ad tempus florendi persistentibus recedit.

Frutex 5–10 m. altus. Ramuli angulati pilosuli vel glabrescentes cortice griseo pustulato praediti. Folia tempore florendi persistentia, opposita, 4–7 cm. longa, 3–4.5 cm. lata, ovata vel subelliptica, apice obtusa vel subobtusa, nec acuminata, basi rotundata, petiolo circiter 5 mm. longo sparse pilosulo praedita, coriacea, integra, supra pustuloso-scabridula nervis obscuris, infra glabra nisi in costa nervisque sparsissime pilosulis, nervis 4–5-paribus eminentibus albo-nitentibus instructa. Flores axillares solitarii vix pedunculati, flavicantes; bracteolae pluriseriatae, ovatae vel rotundatae, minute pilosulae et ciliatae, superne gradatim majores ad 5 mm. longae, floris basim arcte obtegentes. Perianthii foliola exteriora rotundata, circiter 7 mm. longa, intermedia 10–12 mm. longa, elliptica obtusa, interiora circiter 5 mm. longa, late ovata vel suborbicularia, ad 1 mm. unguiculata. Stamina antherifera 5. Fructus deest.

"Shrub of 15–30 ft. Flowers dull yellow. Dry sunny situations amongst scrub at south end of the Sungkwei Valley. Lat. 26° 10′ N. Alt. 6000–7000 ft. November 1910." G. Forrest. No. 7366.

A species closely allied to the well-known *C. fragrans*, Lindl., from which I have separated it with some hesitation. The new species is distinguished by the ovate leaves with broad base persistent at the time of flowering and by the broader and rounder perianth-segments.

632 **Clematis Forrestii,** W. W. Sm. Sp. nov.

Species distinctissima; aspectu haud dissimilis *C. fasciculiflorae*, Franch. sed acheniis sericeis inter alia valde discrepat; foliis ad *C. uncinatam*, Champ. spectat, caeterum diversa; in schemate cl. Finet et Gagnepain * in vicinia *C. Meyenianae*, Walp. ponenda, quae species tamen notis multis facile distinguitur; bracteae conspicuae in poculum connatae gemmam mediam prima aetate cingunt, postea in aperto flore intervallo ± 1 cm. longo a calyce separantur, id quod notae utili est observandum.

Frutex scandens, 6–10 m. altus, caule striatulo cinereo mox decorticante. Folia nodis congesta quasi fasciculata trifoliolata glabra vel infra prope costam pilis rarissimis albidis conspersa; petiolus 2–4 cm. longus glaber, petioluli laterales 1–3 mm. longi; intermedius ad 1 cm.; foliola 2–8 cm. longa, 1–3 cm. lata, ovato-lanceolata, acuta apiculata, basi rotundata, integra (lateralia saepe parte exteriore lobatula), tenuiter chartacea, supra viridia venis primariis tribus indistinctis, infra paulo pallidiora venulis bene reticulatis. Inflorescentia similis ei *Clematidis fasciculiflorae*; flores axillares cernui 5–6-fasciculati; pedicelli sub bracteis connatis 2–3 cm. longi glabri vel pilis albidis sparsissime praediti, supra bracteas 1–1.5 cm. longi, densissime albido- vel flavido-tomentosi; bracteae 5–7 mm. longae in poculum biauritum coalitae extus albido-villosae. Sepala 4, oblonga, 2 cm. longa, 8–10 mm. lata, obtusa, extus dense tomentosa, intus glabra, flavida, venis circ. 7 indistinctis. Stamina circ. 30, sepala aequantia vel paululo superantia, filamentis loriformi-linearibus glabris roseis, antheris 2.5 mm. longis glabris roseis loculis a latere dehiscentibus. Achaenia ovoidea, 3–4 mm. longa multo compressa, margine crassato flavido, dense sericea, stylo fere ad 4 cm. elongato albido-plumoso praedita.

Yunnan, West China.

"Scandent shrub of 20–30 ft. Flowers creamy-yellow,

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* Bull. Soc. Bot. Fr. L (1903), 522.

filaments and anthers bright magenta-rose on trees and scrub in open situations on the western flank of the Shweli-Salwin divide. Lat. 25° 20′ N. Alt. 7000–8000 ft. Dec. 1912." G. Forrest. No. 9398.

"Same locality. Feb. 1913." G. Forrest. No. 9526.

A species with very characteristic bud and bracts; in the young state before the opening of the flower the bud girt round the middle by the connate bracts bears a strong resemblance to the bud of a *Styrax*.

Corydalis calcicola, W. W. Sm. Sp. nov.

Species persimilis *C. trachycarpae*, Maxim.; floribus minoribus, petalis, ovario differt.

Planta 7–20 cm. alta, radicibus plurimis fusiformibus praedita. Caules complures, debiles, adscendentes, paulo complanati, striatuli, basi longe nudi superne in ramulos 2–4 racemiferos divisi. Folia basalia petiolo ad 10 cm. longo flexili praedita; lamina tripinnato-secta, segmentis ultimis lanceolatis acutis; caulina in superiore caule aggregata, alterna, petiolo circ. 1 cm. longo instructa, ambitu oblonga, 4–6 cm. longa, cetera radicalibus subsimilia. Racemi densi multiflori 4–5 cm. longi. Bracteae pedicellos superantes flabellato-pinnatisectae, superiores 3–5-sectae; pedicelli 5–15 mm. longi. Flores pallido-purpurei, apice saturate roseo-purpurei, fragrantes. Sepala minuta, membranacea, orbicularia, profunde lacera. Petali exterioris postici lamina circ. 6 mm. longa, 5 mm. lata, utrinque alata, cristata, obtusa, calcare 10–12 mm. longo subrecto vel paulo decurvo obtuso praedita; petali exterioris antici lamina circ. 9 mm. longa, utrinque alata, carinata; petala interiora apice cohaerentia 6–7 mm. longa. Ovarium ellipsoideum, 3 mm. longum; stylus 4 mm. longus, stigmate 5-lobo.

"Plant of 3–9 inches. Flowers pale purple with tips deep rose-purple, fragrant. On limestone drift on the western flank of the Lichiang Range. Lat. 27° 30′ N. Alt. 13,000 ft. August 1910." G. Forrest. No. 6372.

Cremanthodium comptum, W. W. Sm. Sp. nov.

Species nana foliis late ovatis subtus dense incano-tomentosis, involucri phyllis densissime crispato-nigro-villosis inter congeneres satis conspicua.

Planta 5–7 cm. alta rhizomate longiusculo praedita. Caulis gracilis infra glaber atroruber supra sub inflorescentia crispato-nigro-villosus. Folia 3–4; infimum squamiforme usque ad 2 cm. longum, lamina deficiente vel minima; mediana plerumque duo, 1.5–2 cm. longa, 1–1.5 cm. lata, late ovata, apice obtusiuscula, basi late cuneata vel subrotundata, pro magnitudine grosse serrato-dentata, subcoriacea supra viridia glabra subtus dense incano-araneoso-tomentosa; petiolus 3–5 mm. longus, basi vaginulatus ruber glaber vel subglaber; folium supremum saepius multo reductum fere bracteiforme. Capitulum circ. 2 cm. longum et latum; involucri phylla 12–15, extus densissime crispato-nigro-villosa capillis albidis paucis intermixtis intus glabra nitenti-viridia, ad mediam partem connata; partes superiores lineares 1 cm. longae, 1–2 mm. latae. Flores ligulati circ. 10, circ. 1.5 cm. longi ligulis anguste oblanceolatis apice argute 2–3-denticulatis; pappus albus 6–7 mm. longus; flores disci 20–30.

"China:—Near A-tun-tsi, Western Yunnan, on earth screes at an elevation of 15,000 ft. August 1913." F. Kingdon Ward. No. 975.

600 **Daphne calcicola,** W. W. Sm. Sp. nov.

Species ex affinitate *D. aurantiacae,* Diels; fortasse varietas nana illius speciei aestimari debet sed habitu prostrato, foliis linearibus, floribus minoribus valde recedit.

Fruticulus humilis ramosissimus 30–60 cm. altus, pro maxima parte humifusus; rami crassi nodosi, juniores vestigiis foliorum praeteritorum verrucosi. Folia apices ramulorum versus conferta, vix vel ad 1 mm. petiolata, 7–10 mm. longa, 1–2 mm. lata, linearia vel sublinearia, subacuta, basi paulo angustata, margine ± revoluta, subcoriacea laevia glabra, supra viridia infra pallidiora; costa supra impressa vel obscura, subtus eminens, nervi ceteri ne sub lente quidem visibiles. Flores plerumque bini terminales fere sessiles (pedicellus ± 1 mm. longus) glabri aurantiaci fragrantissimi; tubus 8–9 mm. longus vix 1.5 mm. latus, lobi ovati vel orbiculari-ovati 2.5–3 mm. diametro. Stamina biseriata antheris 1 mm. longis. Ovarium glabrum 1 mm. longum, stylus 0.5 mm. longus, stigma capitatum. Fructus deest.

"China:—Western Yunnan, on limestone above Chung River, Sha-la-ka, 10,500 ft. A low compact shrub. May 1913." F. Kingdon Ward. No. 328.

Approaching *D. aurantiaca,* Diels, in its fragrant yellow flowers, but differing in the prostrate habit, narrow linear leaves and slender perianth-tube.

Erysimum bracteatum, W. W. Sm. Sp. nov.

Species aliqua ex parte anomala; notis plurimis ad *Erysimum* spectat sed racemis bracteatis recedit.

Planta 60–90 cm. alta, erecta, ramosa, satis foliosa, racemis amplis ramulos terminantibus. Folio plerumque 6–8 cm. longa, 4–5 mm. lata, linearia vel angustissime lineari-lanceolata, acuta, in petiolum vix discretum attenuata, insertione angusta, subintegra vel remote denticulata, pilis bipartitis appressis utrinque incana. Racemi ampli, in fructu ad 25 cm. elongati, saepius bracteati; bracteae inferiores foliis similes et aequilongi, superiores minores nonnunquam deficientes, nunc pedicellis 5–10 mm. longis multo majores, nunc multo minores. Sepala circ. 8 mm. longa, lateralia multo latiora, basi gibbosa, omnia sparse incano-pilosula. Petala 13–14 mm. longa, spathulata, aurea, ungue circ. 8 mm. longo. Siliqua ad 10 cm. elongata, compressa, adpresse incano-pilosula; stylus brevis stigmate capitato. Semina 2-seriata, oblonga, vix 2 mm. longa, fulvida.

China:—Near A-tun-tsi, Western Yunnan. Grown by Bees Limited and in the Royal Botanic Garden, Edinburgh, from seed collected under No. 67 by F. Kingdon Ward.

Some inflorescences are bracteate almost to the apex, others more than half-way. The bracts are more or less persistent. Otherwise the appearance of the plant is that of a typical *Erysimum*.

Gaultheria suborbicularis, W. W. Sm. Sp. nov.

Species ex affinitate *G. nummularioidis*, Don, a qua foliis minimis suborbicularibus, floribus multo minoribus staminibus diversis satis recedit.

Fruticulus minimus prostratus. Caulis ramosus gracilis, hinc inde errans, infra defoliatus supra sat foliosus plus minusve sparsius fulvido-setosus. Folia alterna coriacea latissime ovata vel suborbicularia, circ. 6 mm. longa circ. 5 mm. lata, apice basique rotundata, margine breviter remote nigro-setulosa, supra viridia glabra infra pallidiora hinc inde nigro-setulosa vel subglabra; costa supra impressa infra paulo eminens nervis lateralibus utrinque obscuris; petiolus circ. 1 mm. longus. Flores minimi axillares solitarii; pedicelli 1 mm. longi glabri; prope calycem bracteolae duae connatae 2 mm. longae ovatae acutiusculae purpureo-tinctae. Calyx 2 mm. longus glaber 5-partitus in lobos forma et colore bracteolis persimiles. Corolla circ. 3 mm. longa, late campanulata ad medium lobata lobis apice recurvis, rosea ut videtur apice purpureo-tincta. Stamina 10, vix 1 mm. longa, filamentis conicis sub lente minute papillosis, antherarum tubulis brevissimis, aristis nullis. Stylus filiformis vix 1 mm. longus. Fructus deest.

"China:—Western Yunnan, forming carpets under scrub-

rhododendrons at 15,000 ft." F. Kingdon Ward. No. 850 in Herb. Edin.

A puzzling dwarf species very closely allied to *G. nummularioides*, Don. The structure of the stamens suggests its being one form of a *Gaultheria* with dimorphic flowers. It differs, however, too much both in foliage and flower for me to attribute it to an abnormal form of *G. nummularioides* without further evidence. Small states of *G. nummularioides* from the Himalaya do not show the same foliage, nor do they appear to have dimorphic flowers.

Gentiana Beesiana, W. W. Sm. Sp. nov.

Species sectionis *Amarellae,* ex affinitate *Gentianae cyananthiflorae,* Franch.

Planta annua erecta 15–25 cm. alta, e basi ad apicem fastigiato-ramosa. Rami graciles flexiles quadrangulati rubri infra pubescentes, supra mox glabrescentes nitentes. Folia basilaria delapsa ; caulina subremota, circ. 2 cm. longa, circ. 1 cm. lata, ovata vel oblongo-ovata, sessilia, apice obtusa, basi subrotundata, serratula, chartacea. Flores plerumque ternati, nonnunquam solitarii, ramos ramulosque terminantes, longe (1–3 cm.) pedicellati. Calyx 10–12 mm. longus, in lobos quinque fere ad basin partitus ; lobi erecti, latitudine valde inaequales, ovati vel lanceolati vel lineari-lanceolatae (eodem flore), acuti, basi subsaccati, margine serratuli nigrescentes, textura foliis similes, extus praesertim in costa marginibusque sparse albo-pilosi. Corolla 2–2.5 cm. longa, coerulea ; tubus late cylindricus, in sicco 6–7 mm. latus ; lobi 1 cm. longi, oblongi, apice rotundati ; plicae nullae ; fimbriae fauce insertae, multae, 3–4 mm. longae, lineares vel lineari-spathulatae. Stamina in medio tubo inserta, vix ad summas fimbrias pertinentes. Ovarium oblongum ; capsula (immatura) inclusa, sessilis, seminibus multis subglobosis pallido-brunneis nitentibus praedita.

" Plant of 6–9 inches. Flowers blue, plicae green. Open stony pasture on the eastern flank of the Lichiang Range. Lat. 27° 30′ N. Alt. 13,000 ft. October 1910." G. Forrest. No. 6733.

(I do not find any plicae. Mr Forrest's note must refer to those edges of the corolla lobes which have been overlapped.)

Gentiana scabratopes, W. W. Sm. Sp. nov.

Species ex affinitate *Gentianae yunnanensis*, Franch., sed minor ; caule ramosiore, calyce fere ad imum fisso inter alia differt.

Planta annua radicibus gracilibus 2.5–9 cm. alta, erecta. Caulis basi nudus, superne ramulis brevibus erectis vel paulo patentibus omnibus floriferis crebre ramosus, dense nigro-setosulo-scaber. Folia basalia sub anthesin nulla; caulina erecta pauca, cum inflorescentiis intermixta, 1.5–2.5 cm. longa, 1–1.5 cm. lata, ovata vel obovata, apice obtusa vel rotundata, basi late cuneata, in petiolum breve subalatum scabridulum angustata, supra viridia glabra infra in sicco nigrescentia, glabra nisi prope basin scabridulam, nervis subobscuris. Inflorescentiae multae congestae; flores ad apicem caulis et ramulorum 3–5-compacti. Calyx circ. 8 mm. longus, fere ad imum in lobos sublineares acutos apice nigrescentes fissus. Corolla laete coerulea infundibuliformis, circ. 14 mm. longa, lobis 3 mm. longis ovatis mucronulatis; plicae minutae. Stamina sub medio tubo affixa. Capsula (immatura) inclusa, non stipitata, lineari-oblonga seminibus 6–8 reniformibus.

"Plant of 1–2½ inches. Flowers bright blue, plicae dark maroon. Stony pasture on the eastern flank of the Lichiang Range. Lat. 27° 35′ N. Alt. 12,000 ft. October 1910." G. Forrest. No. 6735.

Closely allied to *Gentiana yunnanensis*, Franch., but with a very different calyx. The dark underside of the erect leaves gives a very characteristic appearance to the plant.

Gymnadenia calcicola, W. W. Sm. Sp. nov.

Species valde affinis *G. pseudo-diphylaci*, Kraenzl., sed caule bifoliato, floribus majoribus, labello in lobos tres longos lineares diviso recedit. Forsan varietas speciei citatae, sed intermediis deficientibus melius interim pro specie propria militat.

Tuberidia globosa, circ. 1 cm. diametro. Caulis 8–12 cm. altus, erectus vel nonnunquam curvatus, bifoliatus. Folia prope basin posita 4–7 cm. longa, ad 1 cm. lata, lanceolata vel oblanceolata vel sublinearia, obtusa vel acuta. Spica ad 4 cm. longa, 6–12-flora, bracteis ovato-lanceolatis acuminatis quam flores minoribus ovarium superantibus praedita. Sepala circ. 7 mm. longa, oblique lanceolata, subacuta, rosea. Petala sepalis aequilonga, linearia. Labellum ad 8.5 mm. longum basi integrum deinde trilobum, lobis linearibus, intermedio ad 6.5 mm. longo, lateralibus circ. 5 mm. longis, superficie hyalino-papillosa; calcar 5 mm. longum, incurvulum, apice obtusum incrassatum. Ovarium 5–6 mm. longum.

"Plant of 2–5 inches. Flowers rose. On limestone drift on the eastern flank of the Lichiang Range. Lat. 27° 35′ N. Alt. 13,000 ft. September 1910." G. Forrest. No. 6536.

"Plant of 3–8 inches. Flowers rose, fragrant. Dry pasture at north end of the Tali Valley. Lat. 25° 55′ N. Alt. 7000 ft. November 1910." G. Forrest. No. 7375.

A much finer plant than *Gymnadenia pseudo-diphylax*, Kraenzl., but possibly a variety of that species which appears to be very variable in size of flower and lobing of labellum.

Habenaria Beesiana, W. W. Sm. Sp. nov.

Species habitu, foliis, inflorescentia persimilis *Habenariae Forrestii*, Schltr.; labello trifido differt.

Planta terrestris erecta gracilis 20–30 cm. alta. Tubera anguste oblongoidea. Caulis basi 2–3-foliatus, superne vaginis paucis acuminatis remotis praeditus, teres, glaber. Folia erecto-patentia, linearia acuta, glabra, 4–8 cm. longa, medio vix 2 mm. lata. Spica 7–12 cm. longa, sublaxe multiflora. Bracteae erectae, ovato-lanceolatae, acuminatae, ad medium ovarium pervenientes. Flores in genere inter minores, virides. Sepalum intermedium erectum, ovatum, obtusum, circ. 4 mm. longum, lateralia deflexa, oblonga, obtusa intermedio aequilonga. Petala oblique ovato-lanceolata, obtusa, sepalis aequilonga vel paululum longiora; labellum circ. 5.5 mm. longum, glabrum, in lobos tres lineares fere ad basin divisum; lobus intermedius lateralibus paulo longior; ante ostium calcaris labellum carnoso-incrassatum; calcar cylindricum, glabrum, incurvulum, ovarium aequans vel paulo superans. Ovarium cylindraceum 5–6 mm. longum, glabrum.

" Plant of 4–9 inches. Flowers green. Dry openings amongst scrub on the eastern flank of the Lichiang Range. Lat. 27° 30′ N. Alt. 10,000 ft. August 1910." G. Forrest. No. 6404.

Very near *H. Forrestii*, Schltr., and from the same area. In one plant the lateral lobes of the labellum are very short, and suggest a transition between the two species.

Illigera grandiflora, W. W. Sm. et J. F. Jeffrey. Sp. nov.

Species in sectione *Appendiculatarum*, Dunn prope *I. trifoliatam*, Dunn ponenda; floribus maximis a speciebus omnibus adhuc cognitis facile distinguitur.

Frutex scandens 2–6 m. altus. Caulis striatus setis fulvidis plus minusve densis praesertim apud nodos praeditus, nonnunquam subglabrescens. Folia trifoliolata, petiolis 5–12 cm. longis, foliolis chartaceis ovatis 6–14 cm. longis, 4–12 cm. latis, abrupte acuminatis, basi rotundatis, lateralibus obliquis, supra glabris costa media et venis 4–5-paribus plus minusve fulvido-setosulis vel nonnunquam glabrescentibus; petioluli 1.5–2 cm. longi. Flores in cymas densas petiolis breviores vel in paniculas folia subaequantes dispositi; pedunculi communes ad 5 cm. longi, pedicelli dense fulvido-villosi, bracteae 1–2 cm. longae, foliaceae, lanceolatae vel oblanceolatae vel ellipticae. Flores albidi maculis lineisque minutis rubridis copiose ornati. Calycis tubus dense pubescens; lobi 12–14 mm. longi, circ. 5 mm. lati, oblongi, intus pubescentes. Petala sepalis similia et aequilonga vel paulo breviora. Stamina fere 8 mm. longa, filamentis 5–6 mm. longis, minute puberulis, antheris 2 mm. longis aureis, nectariis tubulosis circ. 4 mm. longis, parte basali pedicelliformi 1 mm. longa, parte superiore ovato-cupulari 3 mm. longa albida, glandulis disci sphaeroideis sessilibus. Stylus circ. 8 mm. longus, longiuscule setosus, stigmate undulato-dilatato. Fructus tetrapterus, 5–6 cm. latus, 3–3.5 cm. longus, glaber, alis coriaceis striato-venosis, majoribus 2.5–3 cm. latis ceteris multo minoribus 2–3 mm. latis.

"Scandent shrub of 8–15 ft. Sepals dull white, copiously speckled with minute dull cerise spots and lines; petals similar, with a ring of ten small sack-like nectaries at base; these white with dark-brown bases, anthers golden yellow. Open situations on scrub in the Mingkwong Valley, Yunnan. Lat. 25° 29′ N. Alt. 6500 ft. June 1912." G. Forrest. No. 8495. *Type.*

"Scandent shrub of 6–10 ft. Flowers dull crimson-lake, anthers yellow. On trees and scrub on lava-bed west of Tengyueh. Lat. 25° N. Alt. 5000 ft. May 1912." G. Forrest. No. 7765.

"Scandent shrub of 6–18 ft. In fruit. On scrub on western flank of the Shweli-Salwin divide. Lat. 25° 20′ N. Alt. 9000 ft. August 1912." G. Forrest. No. 8929.

Impatiens nubigena, W. W. Sm. Sp. nov.

Species foliis superioribus cordato-amplexicaulibus subintegris inter species chinenses adhuc descriptas distinctissima.

Herba 10–30 cm. alta, glaberrima, caule ramosissimo erecto fere ad basin satis bene folioso. Folia alterna subintegra margine paulo undulata, tenuiter membranacea, dimorpha; inferiora longe petiolata, petiolo debili 1.5–3.5 cm. longo; lamina 1.5–3 cm. longa, 1–2 cm. lata, late ovata vel rhombifolia vel suborbicularis, basi late cuneata, apice rotundata vel obtusa; folia media et superiora sessilia cordato-amplexicaulia lobulis rotundatis ad 5 mm. diametro, ovato-oblonga, 2–3 cm. longa, 1–1.5 cm. lata, apice rotundata, nervis utrinque 5–7 obscuris. Inflorescentiae in axillis foliorum amplexicaulium per tres partes caulis orientes, inferiores plerumque 1-florae, superiores saepius 2-floræ; pedicelli 5–15 mm. longi, filiformes; bracteola ovata acuminata membranacea subpersistens sub flore posita.

Flores minimi 1 cm. longi vel minores, tenuissimi, albi. Sepala 2, late ovata, apice indurato-apiculata, basi rotundata, 3–4 mm. longa, 3–5-nervia. Vexillum orbiculare ad 6 mm. longum. Alae sessiles 9–10 mm. longae ; lobus basalis oblique ovatus ad mediam alam pertinens ; distalis fere duplo longior oblongo-lanceolatus. Labelli limbus 6–7 mm. longus, scaphiformis, horizontalis, subtus medio inter basin et apicem acutum calcare vestigiali vix 1 mm. longo, ut videtur incluso praeditus. Filamenta paulo complanata, antheris obtusis, circa pistillum cohaerentibus. Ovarium 3–4 mm. longum, subobtusum. Capsula ad 2.5 cm. longa, linearis. Semina oblonga, 2 mm. longa, minute crebre tuberculata, opaca, fusca.

" Plant of 4–12 inches. Flowers white. Moist situations amongst rhododendron scrub on the western flank of the Lichiang Range. Lat. 27° 25′ N. Alt. 12,000 ft. August 1910." G. Forrest. No. 6368.

Kingdonia, Balf. f. et W. W. Sm. Genus novum Ranunculacearum.

Genus ex affinitate *Anemonearum*, fortasse prope *Thalictrum* melius positum, a quo folio solitario scapo unifloro inter alia abunde discrepat. Herba parva caudice perenni. Folia solitaria ambitu orbicularia, pedatim partita. Flores hermaphroditi solitarii scapo longo suffulti. Involucrum 0. Sepala 5 petaloidea. Petala 0. Stamina usque ad 15, filamentis erectis brevibus antheris minimis. Carpella plerumque 5–7, receptaculo parvo inserta uniovulata. Ovulum a media sutura ventrali pendulum. Achaenia (semimatura) eis *Thalictri* persimilia. Species unica e China occidentali.

Kingdonia uniflora, Balf. f. et W. W. Sm. Sp. nov.

Planta herbacea habitu *Adoxae* ; rhizoma 5–20 cm. longum gracile ; apicem rhizomatis versus inveniuntur squamae cymbiformes tenuiter membranaceae circ. 5 mm. longae e medio quarum oriuntur folium solitarium et scapus solitarius. Folium petiolo 5–7 cm. longo erecto glabro praeditum ; lamina ambitu orbicularis 4–4.5 cm. diametro, pedatim partita in lobos quinque, late cuneatos, ipsos ad $\frac{1}{4}$ vel $\frac{1}{2}$ trilobulatos, margine exteriore argute apiculato-dentatos, supra viridis, infra subglauca, utrinque glabra, nervis basi divergentibus ramosis nec anastomosantibus, ad marginem longitudinaliter percurrentibus. Scapus 7–10 cm. altus, erectus nudus uniflorus gracilis glaber. Flos erectus in sicco circ. 8 mm. diametro. Receptaculum conicum breve vix 1 mm. superans. Sepala 5, circ. 6 mm. longa, medio circ. 2.5 cm. lata, subrhomboidea, apice acuminata basi cuneata in unguem brevem 1 mm. longum, petaloidea, in sicco viridi-albida, purpureo-venulosa; venula primaria in media lamina duas laterales gignens, omnes ad marginem vel vix percurrentes, conspicuae; (aestivatio non nota; flores omnes omnino aperti; in sicco sepala remotiuscula). Petala 0. Stamina 10–15, erecta, brevia 2 mm. longa antheris minimis vix 0.5 mm. longis rimis lateralibus dehiscentibus. Carpella plerumque 5–7, primo stamina aequantia, ovario 1 mm. longo ventricoso stylo subulato 1 mm. longo erecto, deinde aucta, fructu (semimaturo) 4 mm. longo, stylo persistente erga suturam dorsalem deflexo, apice paululo uncinato; semen solitarium a media sutura ventrali pendulum.

"Western China:—In deep shade in damp gullies of Rhododendron forest at an elevation of 13,000 ft., in N.W. Yunnan, bordering on Tibet, in neighbourhood of Doker-la. Coll. July 1913." F. Kingdon Ward. No. 734 in Herb. Edin.

A very distinct genus of *Ranunculaceae* so far monotypic. The habit of the plant is that of a large *Adoxa*. The shape and texture of the leaf recall certain species of *Adiantum*, the structure of the flower suggests *Thalictrum*, especially in the shape of the fruit and the style. The half-ripe fruit seems to indicate that at maturity the style will be persistent and probably slightly bent or hooked at the apex. The uniovulate ovary allocates the genus somewhere in the neighbourhood of *Thalictrum*, but it can scarcely be said to be closely akin to that genus. The generic name is in honour of Mrs Marshall Ward, whose son, F. Kingdon Ward, discovered the plant on the borders of China and Tibet.

Lilium Forrestii, W. W. Sm. Sp. nov.

Species ex affinitate *Lilii Fargesii*, Franch.; foliis pro longitudine latis, floribus 1–2 nutantibus luteo-roseis recedit.

Bulbus 2–2.5 cm. diametro, squamis 10–12 carnosulis, ovatis, apice attenuatis. Caulis 45–90 cm. longus, erectus gracilis glaber, superne sat foliosus, inferne aphyllus. Folia 12–20, 3.5–6 cm. longa, 1–1.8 mm. lata, erecta, laxius imbricata, lanceolata vel oblanceolata, acuta vel subacuta, basi in insertionem latam late cuneata, 4 suprema verticillata, cetera alterna, carnosula, integra utraque facie glabra, supra viridia minutissime favosa, subtus pallidiora rugosula. Flores 1–2, terminales, cernui, pedunculis 12–15 cm. longis glabris. Perianthium 4.5 cm. longum, pallido- vel luteolo-roseum, intus crebre kermesino-maculatum, extus glabrum; segmenta lanceolata, 4.5 cm. longa, 1 cm. lata, obtusa vel subobtusa, apice indurata, mox ex toto recurva, intus ad basin cristis duabus paleaceo-fimbriatis

1.5 cm. longis sulco nectarifero parallelis pererrata. Stamina circ. 2.5 cm. longa, filamentis glabris, antheris circ. 9 mm. longis, polline luteo. Stylus glaber, ovario 1 cm. longo duplo longior, stigmate parvo obscure trilobo. Fructus deest.

"Plant of 1½–3 ft. Flowers yellowish rose with deep lake crimson markings, fragrant. Dry, open situations in pine forests on the eastern flank of the Lichiang Range. Lat. 27° 30′ N. Alt. 10,000–11,000 ft. July 1910." G. Forrest. No. 6224.

"Plant of 18 inches. Flowers shaded pale rose, spotted a deeper shade. Dry, shady situations in pine forests on the eastern flank of the Lichiang Range. Lat. 27° 30′ N. Alt. 12,000 ft. September 1910." G. Forrest. No. 6582.

Marsdenia oreophila, W. W. Sm. Sp. nov.

Species ex affinitate *Marsdeniae lucidae,* Edgew.; foliis subtus rufo-tomentellis, pedunculis longioribus, corolla intus dense pilosa, inter alia differt.

Frutex scandens 2–3 m. altus. Caulis teres molliter denseque albo-pilosulus. Folia opposita, petiolo 2–3 cm. longo dense pilosulo praedita, 6–12 cm. longa, 4–7 cm. lata, elliptica, basi rotundata apice rotundata vel breviter abrupte acuminata, coriacea, supra sparse pilosa, infra pallidiora molliter rufo-tomentella, nervis 4–5 paribus vix conspicuis, arcuatis. Pedunculi petiolis subsimiles, 3–5 cm. longi; cymae umbelliformes 10–15-florae, pedicellis ad 2 cm. longis. Calyx in lobos quinque basi paulo imbricatos ovatos obtusos, extus dense pilosos, intus glabros partitus, basi intus glandulis circ. 10 praeditus. Corolla ad 1 cm. longa, subrotata, in lobos lanceolato-oblongos obtusos recurvo-patentes extus subglabros, intus dense albo-pilosos ad tres partes divisa. Coronae squamae 5 erectae, antheras aequantes; pars dorso antherarum adnata carnosula, 2-umbonata, circ. 2 mm. longa; apice pars libera linguiformis membranacea circ. 1 mm. longa. Stamina circ. 3 mm. longa; filamenta lata carnosula cuspidibus duabus sub antheris positis cartilagineis adnatis praedita; antherae membrana orbiculari inflexa instructae; pollinia oblonga circ. 1 mm. longa. Stylus filiformis 5–6 mm. longus flexuosus. Fructus deest.

"Scandent shrub of 6–10 ft. Flowers deep maroon, white on exterior. On shrub in dry situations at the north end of the Lichiang Valley. Lat. 27° 25′ N. Alt. 9000 ft. July 1910." G. Forrest. No. 6208.

Orchis Beesiana, W. W. Sm. Sp. nov.

Species ex affinitate *Orchidis Giraldianae,* Kränzl.; bracteis et floribus minoribus inter alia recedit.

Planta 25–50 cm. alta, tuberidiis parvis globoso-oblongis. Caulis gracilis substrictus. Folia plerumque 3, remota, 6–12 cm. longa, 1–1.5 cm. lata, oblongo-lanceolata vel lineari-lanceolata, acuta, subcoriacea. Scapus supra folia nudus vel bracteis foliaceis 1–2 praeditus. Spica multiflora (12–20), plus minusve densa, bracteis lanceolatis acuminatis ovarium vix aequantibus viridibus instructa. Sepala 5–6 mm. longa, circ. 2 mm. lata, oblonga, obtusa reflexa, sicut petala rosea. Petala 5 mm. longa, 2.5 mm. lata, ovato-elliptica, obtusa ; labellum magnum, 8 mm. longum, circ. 7 mm. latum, profunde trilobum, lobis subquadratis, paulo erosulis, intermedio vix bilobulo, calcari circ. 1 cm. longo recto obtuso, ovarium paulo superante.

" Plant of 9–20 inches. Flowers rose. Stony mountain meadows on the eastern flank of the Lichiang Range. Lat. 27° 25′ N. Alt. 11,000–12,000 ft. August 1910." G. Forrest. No. 6464.

Ostryopsis nobilis, Balf. f. et W. W. Sm.

Species haec pulchra ab *O. Davidiana*, Decne. (adhuc specie unica) foliis multo majoribus subtus dense fulvo-tomentosis fructibus ad rhachim elongatam laxius spiciformiter dispositis nec in capitulum conglomeratis inter alia signa minora differt.

Frutex 2–4 m. altus, ramosus, ramulis primo densissime cinereo-tomentosis deinde subglabrescentibus. Folia 6–12 cm. longa, 5–10 cm. lata, alterna, late ovata vel rotundato-ovata, apice rotundata vel subrotundata, basi breviter et ± oblique cordata, subregulariter dentata dentibus indurato-apiculatis, supra subglabra costa venisque ± fulvo-pilosis, subtus densissime fulvo-tomentosa nervis 7–9-paribus supra impressis infra paulo eminentibus ; petioli breves 5–10 mm. longi tomentosi ; stipulae binae lanceolatae submembranaceae utrinque pilosae, subpersistentes. Flores masculi desunt. Flores feminei in spicam terminalem brevissimam tomentosam dispositi ; bracteae ovatae acuminatae biflorae in fructu persistentes auctae ; flos unusquisque involucello convoluto ± regulariter 2–4-lobo praeditus ; spica fructifera 3–4 cm. longa laxiuscula ; nuculae circ. 5 mm. longae, 3 mm. latae paulo compressae, perianthii limbo post anthesin accreto coronatae ; involucella circ. 12 mm. longa, cymbiformia, acuminata apice 2–4-lobulata coriacea extus densius intus sparsius tomentosa.

" Shrub of 6–12 ft. In fruit. In open thickets on the mountains in the N.E. of the Yangtze bend. Lat. 27° 45′ N. Alt. 10,000–11,000 ft. June 1913." G. Forrest. No. 10,343.

A very interesting addition to a genus hitherto monotypic.

Parrya Forrestii, W. W. Sm. Sp. nov.

Inter species adhuc descriptas floribus flavis conspicua.

Planta 10–20 cm. alta; radix praelonga, crassa, multiceps. Caules plures subdecumbentes, basi vaginis emarcidis stramineis vestiti, supra foliosi, pilis albidis adpressis medio affixis hinc inde induti. Folia longe petiolata petiolo 4–6 cm. longo, spathulata; lamina 2–4 cm. longa, 1–1.5 cm. lata, apice obtusa vel rotundata, nonnunquam obtuso-mucronulata, basi in petiolum leviter cuneatim attenuata, membranacea, integra vel remote 5–6-denticulata, utrinque pilis albidis adpressis medio affixis sparsius praedita, pallide virentia, infra vix pallidiora, nervis obscuris. Scapi breves, foliosi; racemi 6–12-flori, breves, supra folia non eminentes; bracteae inferiores foliis similes, superiores reductae; pedicelli primo 5–10 mm. longi, tandem ad 2.5 cm. elongati. Sepala 7–8 mm. longa, oblonga, margine scariosa, erecta subaequalia, extus sparse albo-pilosa. Petala 1.5 cm. longa, spathulata, ungue 8 mm. longo, flava. Stamina 8 mm. longa, antheris 1.5 mm. longis. Siliqua compressa, ad 6 cm. elongata, 3–4 mm. lata, valvis uninerviis, pilis adpressis medio affixis sparse induta; stylus brevissimus; semina 1-seriata, 5–6, orbicularia, compressissima, (vix matura) circ. 3 mm. diametro.

"Plant of 4–8 inches. Flowers yellow. On limestone drift on the western flank of the Lichiang Range. Lat. 27° 25′ N. Alt. 12,000–13,000 ft. August 1910." G. Forrest. No. 6518.

7847 **Phyllanthus Forrestii,** W. W. Sm. Sp. nov.

Species sectionis *Reidiae* ex affinitate *Phyllanthi pulchri*, Wall.

Fruticulus 15–20 cm. altus, erectus; pars inferior caulis subterranea vel inter saxa ut videtur errans, nuda; pars superior ramosa foliosa; ramuli hornotini subfastigiati 10–16 cm. longi, gracillimi rubridi glabri. Folia alterna disticha oblique imbricata, 1–2 cm. longa, circ. 1 cm. lata, orbicularia vel oblonga vel obovato-oblonga, apice rotundata breviter apiculata, basi rotundata, integerrima, supra viridia subtus glaucescentia, utrinque glabra, nervis 3–4 paribus obscuris; petiolus brevissimus vix 1 mm. longus; stipulae lineari-lanceolatae, circ. 2 mm. longae, acuminatae, pallido-virides. Flores parvi axillares, ♂ pedicellati saepius in axillis inferioribus pauci, ♀ in axillis superioribus solitarii, longius pedicellati; pedicelli ad 1 cm. longi, graciles, dense scabriduli. Floris masculini sepala 4, petaloidea, ovata, alte serrato-lacerata, circ. 2.5 mm. longa, appendiculo filiformi circ. 2 mm. longo apice praedita; cum appendiculis flos circ. 9 mm. diametro; glandulae reniformes carnosulae apice crenato-lobatulae; stamina 2, antheris circa pistillodium minutum ad apicem columnae sessilibus, loculis disjunctis cruciatim dispositis antheras 4 uniloculares simulantibus. Floris feminini sepala 6, biseriata, petaloidea, ovato-lanceolata, serrato-lacerata, cum appendiculo 2 mm. longo circ. 6 mm. longa; glandulae reniformes carnosulae apice crenato-lobatulae; ovarium dense scabridulum; styli 3, bifidi. Fructus deest.

"Shrub of 6–8 inches. Flowers deep crimson. Dry stony meadows on the margins of pine forests on the eastern flank of the Lichiang Range. Lat. 27° 40′ N. Alt. 10,000–11,000 ft. July 1910." G. Forrest. No. 6119.

Pieris Forrestii, Harrow. Sp. nov.

Species valde affinis *Pieridi formosae*, D. Don; foliis floribusque primo intuitu persimilis est sed habitu, sepalis albidis, corollā ore minore pentagono nec rotundo lobis brevissimis erectis paulo diversā, stylo graciliore satis divergit.

Frutex suberectus ramis pendentibus, sempervirens, in horto nunc 1 m. altus, glaber. Folia 6–12 cm. longa, 2–3.5 cm. lata, oblongo-lanceolata vel oblanceolata, breviter acuminata, basi cuneata vel subrotundata, crebre serrulata, coriacea, glaberrima, utrinque pulchre reticulata venis translucentibus, nitida; petioli 4–7 mm. longi. Flores penduli in paniculas terminales pendentes ad 15 cm. longas latasque dispositi; rhachis, ut pedicelli bracteae sepala, glandulis minutis nigris conspersa; bracteae lineari-lanceolatae, 2–3 mm. longae; pedicelli circ. 5 mm. longi, graciles, infra medium bracteolis duabus parvis praediti. Calycis albidae lobi circ. 5 mm. longi, ovato-lanceolati, coriacei, acuti, glabri glandulis minutis exceptis. Corolla urceolaris, alba, circ. 9 mm. longa, ore parvo 3 mm. diametro pentagono, lobis brevissimis erectis. Stamina 10 inclusa; filamenta alba, parce pilosa, basi dilatata; antherae dorso longiuscule biaristatae. Ovarium depresso-globosum, stylo gracili corollam aequante. Fructus deest. *Gaultheria Forrestii*, Hort. nec Diels in Gardening Illustrated, vol. xxxv (1913), 266.

China:—Yunnan; known only from plants grown in the nurseries of Bees Limited, and in the Royal Botanic Garden, Edinburgh, from seed obtained by George Forrest.

This new species is a most graceful shrub, closely resembling *Pieris formosa*, Don, and at first sight easily mistaken for it. It differs, however, in several minor points, the sum of which is beyond mere varietal divergence. The habit is much more pendent, with the leaves often peculiarly reflexed along the branches; the pedicels are slenderer with narrower bracts;

the sepals are whitish ; the urceolate corolla is of somewhat different shape, longer, rounder, with a very characteristic narrow mouth with straight-cut pentagonal edges, the lobes shorter and more erect ; the style is longer and slenderer. The plant so far is difficult to propagate as compared with its ally.

Polygonum lichiangense, W. W. Sm. Sp. nov.

Species valde affinis *Polygono polystachyo*, Wall. ex Himalaya ; ramis stipulisque setosis, foliis supra setosis infra dense cinereotomentosis recedit.

Planta 60–120 cm. alta, erecta, basi suffruticosa, ramis ramulisque striatis setis albidis vel fulvidis e pustulis parvis ortis plus minusve dense praeditis. Folia 6–12 cm. longa, 2–3 cm. lata, lanceolata vel oblongo-lanceolata, apice caudato-acuminata, basi in petiolum brevissimum late cuneata, margine undulata vel subintegra, chartacea, supra viridia setis albidis adpressis modice instructa, infra tomento denso cinereo praedita, nervis 8–12-paribus obscuris ; stipulae 2–3 cm. longae saepius lanceolatae membranaceae setosae brunneae. Inflorescentiae amplae thyrsoideo-paniculatae ; ramuli dense patenti-albido-pilosi ; bracteae bracteolaeque lanceolatae membranaceae brunneae ; pedicelli graciles, circ. 2 mm. longi ; flores subcongesti 7–8 mm. diametro. Perianthium album fere ad imum in segmenta quinque inaequalia late obovato-spathulata fissum. Fructus maturus deest.

" Plant of 2–4 ft. Flowers creamy-white. Open situations on the margins of mixed forests on the eastern flank of the Lichiang Range. Lat. 27° 40′ N. Alt. 10,000–11,000 ft. August 1910." G. Forrest. No. 6296.

2730

Porana decora, W. W. Sm. Sp. nov.

Species pulchra ex affinitate *Poranae grandiflorae*, Wall. et *P. sinensis*, Hemsl. ; ab illa sepalis dense sericeo-villosulis, ab hac tubo corollae longo angustissimo inter alia discrepat.

Frutex alte scandens ramis longis volubilibus densius adpresse incano-villosis. Folia inferiora petiolo 4–6 cm. longo supra canaliculato incano-villosulo praedita ; lamina usque ad 12 cm. longa, usque ad 10 cm. lata, late cordiformis apice acute abrupte acuminata, basi sinu lato alte cordata, papyracea, supra ± dense adpresse sericeo-villosula, infra dense incano-villosula venis primariis plerumque 7, utrinque conspicuis ; folia in regione inflorescentiae multo minora, sessilia vel brevissime petiolata, caulem amplectantia, ad 3.5 cm. longa, ad 2.5 cm. lata, cetera inferioribus similia. Flores in racemos paniculatos pendentes dispositi ; racemi in axillis foliorum superiorum subbracteiformium orientes, in quaque panicula 10–20, 3–12-flori; pedunculi 5–10 cm. longi, sparse vel dense incano-villosuli, pedicelli circ. 1 cm. longi subglabri vel incano-villosuli bracteis subulatis vix 1 mm. longis incano-villosulis praediti. Sepala 5, rarius 6, aequalia vel subaequalia circ. 2 mm. longa, lanceolata acuminata dense sericeo-villosula, sub fructu valde aucta circ. 3 cm. longa, 5–7 mm. lata, subaequalia, oblonga, apice apiculata, membranaceo-scariosa, basi villosula excepta glabra, purpureo-venosa. Corolla roseo-alba circ. 2.5 cm. longa, anguste infundibuliformis, tubus circ. 1.5 cm. longus, parte inferiore linearis 1 mm. latus, superne ampliatus, glaber; limbus in sicco 1.5–2 cm. latus. Stamina vix medium tubum superantia glabra filamentis filiformibus. Ovarium circ. 1 mm. longum, glabrum; stylus 3–4 mm. longus glaber stigmate capitato; capsula subglobosa 6–7 mm. longa.

China :—Province of Yunnan.

"Climbing shrub with long branches; leaves white below; flowers delicate, rose-white, in loose pendent masses. Rocks in the valley of Ma-li-ouan. Altitude 2600 m. August 1913." Coll. E. E. Maire. No. 64 in Herb. Edin.

The same in fruit. November 1913. Coll. E. E. Maire. No. 65 in Herb. Edin.

Potentilla Forrestii, W. W. Sm. Sp. nov.

Species valde affinis *Potentillae niveae*, Linn.; statura majore, foliis subtus incano-tomentosis, segmentis calycis exterioribus obovatis profunde trifidis, carpellis maturis stylo brevioribus recedit. Ab varietatibus omnibus illius speciei polymorphae ita differt ut vix recte in grege earum collocari possit.

Caudex crassus multiceps caudiculis caespitosis residuis fuscis stipularum indutis. Caules floriferi numerosi (± 12), mediocriter validi, erecti vel adscendentes 20–30 cm. longi oligophylli, pauciflori, sicut pedunculi plus minusve incano-tomentosi. Folia radicalia plerumque ternata, interdum 4–5-nata (segmentis externis multo minoribus), caulina minora ternata, floralia reducta ternata vel simplicia; petioli foliorum radicalium 5–15 cm. longi, incano-tomentosi atque (saepe) longius villosi; petioli foliorum superiorum 5–20 mm.; stipulae fol. rad. scariosae ferrugineae basi lata breviter adnatae auriculis lanceolatis, caulinae herbaceae oblongo-lanceolatae acutae integrae vel apice 3–4-incisae; foliola sessilia, medianum nonnunquam petiolulatum, ambitu obovata, rarius oblonga, plerumque 2–3 cm. longa, 1–1.5 cm. lata, grosse serrata, serraturis circ. 14 oblongis 4–5 mm. longis acumine villoso instructis, supra densius parcius adpresse pilosa, subtus tomento incano dense obtecta, nervis supra impressis subtus paulo elevatis. Inflorescentiae plerumque 1–3-florae; pedunculi ad 8 cm. longi; flores 1.5–2 cm. lati. Calyx longiuscule dense incano-villosus; sepala exteriora circ. 8 mm. longa interioribus plerumque longiora, ambitu obovata vel ovata in lobos lineares vel lineari-lanceolatos profunde 3-(rarius 4–5)-fida, exteriora 6–7 mm. longa, lanceolata, acuta. Petala circ. 1 cm. longa, late obovata flava. Stamina 20 filamentis brevibus; annulus staminifer glaber disco angusto albo-piloso a receptaculo separatus. Carpella numerosa receptaculo albo-piloso inserta ovoidea levia circ. 0.5 mm. longa; stylus primo basi vix incrassatus, sed in maturo fructu certe ad *Conostylas* spectat, circ. 2 mm. longus; carpella matura circ. 1 mm. longa, stylo duplo breviora.

Only known in cultivation in the Royal Botanic Garden, Edinburgh, but almost certainly from the province of Yunnan, China. It was found among seedlings of Chinese species, the parent plants of which were collected by George Forrest. It is not, however, represented among the Potentillas of Mr. Forrest's Chinese collections. *Potentilla nivea*, Linn., is not recorded from Southern China and does not appear in the recent collections of Mr. Forrest. *Potentilla nivea*, Linn., var. *elongata*, Th. Wolf, a Central Asiatic and Mongolian plant, comes nearest to the new species. None of the Himalayan forms approach the Yunnan plant. Owing to the characteristic calyx and long style, I have separated it from *P. nivea*, Linn., though with hesitation in view of the polymorphic nature of that species. In the description I have followed closely the sequence of Dr. Wolf, so that comparison of the two species can easily be made.

Potentilla taliensis, W. W. Sm. Sp. nov.

Species affinis *Potentillae pedunculari*, Don sed inflorescentia corymbosa multiflora inter alia differt.

Planta 20–40 cm. alta. Caudex crassus residuis fuscis stipularum dense vestitus pauciceps. Caules floriferi erecti vel ascendentes graciles 1–2-phylli, folia radicalia aequantes vel paulo superantes, apice floribus 8–10 sublaxe corymbosi, sicut petioli et pedunculi longiuscule albo-villosi eglandulosi; folia radicalia magna, petiolo 2–4 cm. longo, non interrupte pinnata, circ. 15-juga, petiolo incluso 10–20 cm. longa, ambitu oblonga; caulina plerumque solummodo unum in tertio superiore caulis, multo minora circ. 5-juga, petiolo 1–1.5 cm. longo praedita; floralia multo reducta simplicia; stipulae foliorum radicalium scariosae ferrugineae petiolo longe adnatae, illae folii caulini magnae herbaceae late-ovatae incisae, illae foliorum floralium lanceolatae acutae parcius incisae vel subintegrae; foliola foliorum radicalium non contigua, basi lata sessilia, basin folii versus magnitudine sensim decrescentia, superiora 2–2.5 cm. longa, 6–8 mm. lata infima 5–8 mm. longa, ambitu oblonga, circumcirca inciso-serrata, supra viridia subglabra vel parce pilosa, subtus in venis venulisque dense pilis longis adpressis argenteo-sericea. Flores longe pedunculati, conspicui, circ. 2 cm. lati. Sepala externa lanceolata integra, interna longiora ovata, omnia parcius sericeo-pilosa. Petala obovato-orbiculata integerrima, calycem duplo superantia, flava. Stamina 20 annulo glabro inserta. Receptaculum albo-pilosum; carpella (immatura) globosa fusca stylo laterali praedita.

" Plant of 9–15 inches. Flowers yellow. In alpine pasture on the eastern flank of the Tali Range. Lat. 25° 40′ N. Alt. 10,000–11,000 ft. Aug. 1910." G. Forrest. No. 7017.

Randia lichiangensis, W. W. Sm. Sp. nov.

Species affinis *Randiae tetraspermae*, Roxb.; corollae flavae tubo brevissimo inter alia differt.

Frutex 60–120 cm. altus. Rami crassiusculi rigidi cortice brunneo rugosulo obtecti, fulvo-pilosuli; ramuli foliati floriferique rigidi breves, 0.5–3 cm. longi, pilosuliores, stipulis foliorum emortuorum multis congestis saepe praediti. Folia brevissime (vix 1 mm.) petiolata 1–1.5 cm. longa, 1–1.2 cm. lata, late ovata vel obovata, apice rotundata vel obtusa, basi late cuneata vel subrotundata, chartacea, atroviridia integra, supra sparse pilosula, infra densius nervis circ. 3 paribus subeminentibus; stipulae latissime ovatae, squamiformes, brunneo-membranaceae, mucronatae, fulvo-ciliatae, diu persistentes. Flores ad apices ramulorum solitarii, parvi, basi stipulis tecti. Calyx ad 3 mm. longus, extus pilosulus, intus glaber, ad medium vel ultro in lobos triangulares acutos ciliatos divisus. Corolla hypocrateriformis, vix 8 mm. longa, teste collectore flava; tubus brevissimus vix 3 mm. longus, intus albo-hirsutulus; lobi circ. 5 mm. longi, ovati, patentes, extus glabrescentes, intus sparse pilosuli, integri. Stamina 5, exserta, filamentis brevissimis, antheris linearibus acutis fere 3 mm. longis. Stylus fusiformis. Fructus deest.

" Shrub of 2–4 ft. Flowers yellow. Amongst scrub in dry situations on the divide between the Hoching and Lichiang Valleys. Lat. 26° 50′ N. Alt. 8000–9000 ft. May 1910." G. Forrest. No. 5541.

Rhododendron cuneatum, W. W. Sm. Sp. nov.

Species affinis *R. Augustinii*, Hemsl. foliis minoribus infra glabris, calyce valde diverso recedens; ad *R. polylepis*, Franch., ad *R. Searsiae*, Rehder et Wilson, ad *R. heliolepis*, Franch. ad

R. detersile, Franch. spectat; ab omnibus tamen foliis calyceque discrepat.

Frutex 1–1.5 m. altus, erectus, ramosus; ramuli hornotini breves initio dense fulvo-lepidoti, demum fusci et verruculosi, vetustiores cinerei decorticantes; gemmae florales ovoideae perulis obovatis vel oblongis, exterioribus acutiusculis, interioribus truncatis, omnibus in medio dorso dense nitenti-lepidotis, margine albo-ciliolatis. Folia 2.5–3.5 cm. longa, 1–1.5 cm. lata, oblanceolata vel lanceolata vel subelliptica, apice subacuta vel subobtusa, indurato-apiculata, basi cuneata saepe latius, margine plus minusve revoluta, coriacea, supra atroviridia, rugosula, nitidula squamulis crebris vix contiguis tandem marcescentibus albidis conspersa, subtus pallidiora squamulis contiguis nitenti-fulvidis vestita; costa media supra impressa, subtus elevata nervis secundariis obsoletis. Flores 1–3 fere umbellati, pedicelli 5–10 mm. longi, nitenti-lepidoti; bracteae lineares vel oblongo-lanceolatae, albo-ciliolatae, caducae. Calyx cupularis 8–9 mm. longus, membranaceus, fere ad imum fissus in lobos subaequales ellipticos apice obtusos vel rotundatos margine crispatulos albo-ciliolatos, in medio dorso rubescentes atque nitenti-lepidotos, caetera flavescentes. Corolla infundibuliformis roseo-lavendulacea, circ. 2.5 cm. longa, 5-loba, tubo circ. 1 cm. longo, ad fauces glabro, intus ad partem villosulam staminum ipso albo-villosulo, lobis circ. 1.5 cm. longis erecto-patentibus subellipticis vel ovatis, apice rotundatis. Stamina 10, inaequalia, longiora corollam fere aequantia, filamentis purpureis paulo complanatis, in sextante inferiore basi ipsa excepta albo-villosulis, antheris circ. 1.5 mm. longis brunneis. Ovarium conicum, circ. 2 mm. longum, dense lepidotum; stylus purpureus glaber, longiuscule exsertus, fere 3 cm. longus, stigmate lobulato-capitato, atropurpureo.

"Shrub of 3–5 ft. Flowers rose-lavender. On the margins of pine forests on the eastern flank of the Lichiang Range. Lat. 27° 35′ N. Alt. 12,000 ft. October 1910." G. Forrest. No. 6738.

2859 **Rhododendron oreotrephes,** W. W. Sm. Sp. nov.

Species affinis *Rhododendro rigido*, Franch.; foliis supra vix lucidis, infra dense lepidotis, floribus multo majoribus inter alia recedit.

Arbor vel frutex 5–8 m. alta, ramulis rigidis cortice griseo tectis; gemmae ellipticae acutiores, squamulis inferioribus orbicularibus coriaceis subglabris, superioribus obovatis membranaceis extus dense lepidotis margine albo-ciliolatis. Folia 4.5–5 cm. longa, 2.5–3 cm. lata, ovata vel elliptica, subacuta, brevissime indurato-apiculata, basi rotundata, saepe breviter cordatula, rigide coriacea, supra glabra, infra dense lepidota subglauca, nervis 7–9 paribus, supra subobscuris, infra obscurissimis; petiolus 8–13 mm. longus glaber. Flores 4–5-nati, suberecti, 3–3.5 cm. longi, saturate roseo-lavendulacei (ex collectore), saturatius maculati atque striati; pedicelli 2.5–3.5 cm. longi, sparse lepidoti. Calyx circ. 2 mm. longus, membranaceus, dense lepidotus, in lobos quinque ovatos obtusos fere ad imum fissus. Corolla 3–3.5 cm. longa, late infundibuliformis glaber; tubus basi 5 mm. latus, ad 2 cm. ore ampliatus; lobi patentes ovati vel subrotundati, integri. Stamina 10, tubo exserta, filamentis supra glabris, infra dense albo-pilosis. Ovarium circ. 5 mm. longum, oblongum, dense lepidotum, stylo glabro corollam aequante. Fructus deest.

"Shrub or tree of 15–25 ft. Flowers deep rose-lavender with darker markings. In rhododendron forest on the western flank of the Lichiang Range. Lat. 27° 20′ N. Alt. 11,000–12,000 ft. June 1910." G. Forrest. No. 5873.

Closely allied to *Rhododendron rigidum*, Franch., but with different leaves and larger flowers.

98 **Rhododendron prostratum,** W. W. Sm. Sp. nov.

Species valde affinis *Rhododendro saluenensi*, Franch.; habitu prostrato, foliis minimis ellipticis supra rugosulis lucidis primo tota margine ciliatis, floribus solitariis vel binis, longiuscule pedicellatis, corollae tubo brevissimo inter alia differt; calycis segmentis miro modo appropinquat; praeterea ad *R. dendrocharin*, Franch. spectat quod tamen calyce corollaque multo minore facile distinguitur.

Fruticulus 5–10 cm. longus, humi prostratus, ramosus; ramuli hornotini breves, foliosi, longe rufo-setosi, lepidoti, vetustiores fusci, mox decorticantes, omnes apice juniorum florigera excepta solo adpressi; gemmae ovoideae perulis ovatis vel ellipticis extus dense lepidotis margine albo-ciliatis. Folia 6–8 mm. (raro 12 mm.) longa, circ. 5 mm. (raro 7 mm.) lata, elliptica, apice rotundata vel obtusa, minute apiculata vel breviter emarginata, basi rotundata vel late cuneata, margine revoluta, primo ubique longe albo-ciliata, deinde glabra, coriacea, supra atroviridia, rugosula, lucida, squamulis absentibus nisi perpaucis in prima aetate, subtus squamulis contiguis subflavidis vel rufescentibus vestita; costa media supra impressa, subtus evanida, nervis secundariis supra rugositatem efficientibus, infra invisibilibus; petiolus 1–2 mm. longus, sparsius lepidotus atque rufo-setosus. Flores saepius solitarii, nonnunquam bini e gemma terminali orti, pedicellis 1–2 cm. longis, lepidotis et simul dense rubro-setosis instructi, ut videtur subcernui. Calyx ei *R. saluenensis* simillimus, membranaceus, extus sparsius lepidotus vel elepidotus, ex toto rubescens, fere ad imum in lobos quinque ovatos vel obovatos vel suborbiculares circ. 7 mm. longos albo-ciliatos fissus. Corolla perlate infundibuliformis, fere 2 cm. longa, kermesina, hinc inde saturatius notata, 5-loba, tubo 5–6 mm. longo, intus ad fauces albo-villoso, lobis late ovatis vel suborbicularibus, 12–15 mm. longis, 10–12 mm. latis extus in medio dorso sparsius lepidotis atque albo-villosulis, nonnunquam elepidotis atque subglabris. Stamina 8–10, corolla multo minora, filamentis purpureis circ. 9 mm. longis in sextante inferiore albo-villosis, antheris circ. 1 mm. longis, ochraceis. Ovarium circ. 3 mm. longum, conicum, dense lepidotum ; stylus circ. 1.5 cm. longus, purpureus glaber stigmate lobatulo-capitato. Capsula deest.

" Prostrate shrub of 2–4 inches. Flowers crimson, with a few darker markings. On rocks and peaty moist soil almost at the limit of vegetation on the eastern flank of the Lichiang Range. Lat. 27° 20′ N. Alt. 15,000–16,000 ft. June 1910." G. Forrest. No. 5862.

A species very near indeed to *R. saluenense*, Franch. ; the latter species as described by Franchet in Journ. de Bot., xii (1898), 263, appears to be very variable, especially in the size of the leaves ; it differs *ex descriptione* from *R. prostratum* in habit, leaves, pedicels, and corolla, but not to a great degree in any one of these characters. I have not seen the original types collected by Soulié, but Forrest No. 511, from the same area (Mekong-Salwin divide), was compared at Paris with these types and considered conspecific. This sheet, No. 511, is not very ample, but presents several differences from No. 5862 from the Lichiang Range ; there is, however, a great similarity in the peculiar calyx, and this similarity, together with the variability in size of leaf as noted by Franchet, has caused me much hesitation in separating No. 5862 by something more than a varietal name.

Rhododendron rupicolum, W. W. Sm. Sp. nov.

Species ex affinitate *Rhododendri fastigiati*, Franch. ; foliis floribusque differt ; *R. verruculosum*, Rehder et Wilson, *R. Edgarianum*, Rehder et Wilson, *R. nitidulum*, Rehder et Wilson, inter alia signa floribus solitariis recedunt ; fortasse *R. violaceum*, Rehder et Wilson, (a nobis non visum) ex Szechuan proximum est sed ex descriptione foliis angustioribus, calyce multo minore inter alia distinguitur.

Frutex 60–120 cm. altus, habitu *R. fastigiato*, Franch.

simillimus, ramosissimus, ramis saepe pseudo-dichotome abeuntibus; ramuli hornotini dense fusco-lepidoti, vetustiores cinerei atque decorticantes; gemmae ovoideae subobtusae, perulis paucis suborbicularibus vel ellipticis extus dense lepidotis margine albo-ciliolatis. Folia circ. 1.5 cm. longa, 7–8 mm. lata, elliptica, apice rotundata vel obtusa, minute apiculata, basi rotundata, rarius late cuneata, margine vix vel paulo revoluta, coriacea, supra atroviridia squamulis nitidulis omnino obtecta, subtus squamulis contiguis flavescentibus et fuscis (intermixtis) vestita; costa media supra impressa, subtus conspicua, nervis secundariis evanidis; petioli 2–3 mm. longi dense lepidoti. Flores 2–5 e gemma terminali orti, pedicellis circ. 2 mm. longis dense lepidotis instructi. Calyx cupularis 4–5 mm. longus, firmus, persistens, extus dense lepidotus, atropurpureus, profunde 5-lobus, lobis aequalibus vel inaequalibus, ellipticis vel ovatis, rotundatis vel obtusis margine albo-ciliatis. Corolla late infundibuliformis, circ. 1.5 cm. longa, saturate purpurea, 5-loba, tubo 6–7 mm. longo intus ad fauces albo-villoso, lobis subellipticis apice rotundatis 8–9 mm. longis circ. 5 mm. latis extus in medio dorso sparsius nitenti-lepidotis. Stamina 8–10, corollam subaequantia, filamentis purpureis circ. 1.2 cm. longis in sextante inferiore basi ipsa excepta villosis, antheris 1 mm. longis ochraceis. Ovarium conicum dense lepidotum; stylus circ. 1.7 cm. longus, stamina superans, purpureus, glaber, stigmate capitato. Capsula deest.

"Shrub of 2–4 ft. Flowers deep rich plum-purple. Amongst rocks on dry barren pasture on the western flank of the Lichiang Range. Lat. 27° 20′ N. Alt. 14,000 ft. June 1910." G. Forrest. No. 5865.

Not matched in the herbaria of Kew or Paris, but closely related to *R. fastigiatum*, Franch. Among the closely allied members of the section *Osmothamnus* it is conspicuous by the colour of the flower.

Rhododendron Traillianum, G. Forrest et W. W. Sm. Sp. nov.

Species affinis *Rhododendro adenopodo*, Franch. quod foliis subtus albidis, lobis calycis longioris glanduloso-ciliatis, ovario setoso inter alia differt; *R. Przewalskii*, Maxim. (= *R. kialense*, Franch.) foliis multo minus tomentosis, pedicellis glaberrimis, corolla minore discrepat; *R. Beesianum*, Diels colore corollae saturate roseo, ovario dense ferrugineo-tomentoso satis recedit.

Frutex 6–10 m. altus, ramulis crassis, hornotinis tomento sparso furfuraceo praeditis. Folia 8–11 cm. longa, 3.5–4 cm. lata, elliptica vel oblanceolata, apice breviter acutata atque apiculata, basi late cuneata, margine plana, coriacea, supra atroviridia rugosula, subtus tomento denso ferrugineo-fulvo detersili omnino vestita; costa media supra impressa, subtus elevata, aeque cum lamina tomentosa; nervi secundarii 10–15 utrinque, supra paululo impressi, intra marginem arcuato-anastomosantes, infra obscuri; petioli 2–2.5 cm. longi tomentello furfuraceo tenuissimo praediti. Flores 9–15 umbellato-racemosi; pedicelli circ. 2 cm. longi, densius tomentelli, bracteis paucis linearibus deciduis praediti. Calyx minimus, circ. 1 mm. longus, cupularis glaber 5-lobus. Corolla alba, maculis lineisque saturate kermesinis notata, circ. 3.5 cm. longa, circ. 4 cm. ore (in sicco) lata, e basi late tubulari infundibuliformi-campanulata, 5-loba, tubo circ. 2 cm. longo, lobis subrotundatis circ. 1.5 cm. longis circ. 2 cm. latis emarginatis. Stamina 10–12, inaequalia, longiora circ. 2 cm. longa, filamentis stramineis, quadrante vel triente inferiore dilatata et albo-pilosula, cetera glabra, antheris ochraceis circ. 1.5 mm. longis. Ovarium subcylindricum circ. 5 mm. longum, minute sparse albo-pilosulum; stylus subrectus, circ. 3 cm. longus, glaber, stigmate lobulato-capitato atropurpureo. Fructus deest.

"Shrub or tree of 20–30 ft. Flowers white with deep crimson markings. In rhododendron forest on the western flank of the Lichiang Range. Lat. 27° 30′ N. Alt. 11,000–12,000 ft. June 1910." G. Forrest. No. 5870.

Rhododendron Wardii, W. W. Sm. Sp. nov.

Species valde affinis *R. Souliei*, Franch.; foliis petiolis calycis formā persimilis, calyce evolutiore, corolla majore carnosula laete flava nec purpurascenti nec rosea satis discrepat.

Frutex 5–7 m. altus; ramuli crassiusculi initio sparse glandulosi mox glabri, vetustiores cinerei decorticantes. Folia petiolo 2–3.5 cm. longo supra canaliculato primo puberulo mox glabro praedita; lamina 5–11 cm. longa, 2–6 cm. lata, elliptica vel oblonga, apice rotundata vel subrotundata indurato-apiculata, basi rotundata cordatula, coriacea, utrinque glabra, supra atroviridis rugosula infra pallidior nonnunquam olivacea; costa media supra paululo impressa subtus paulo elevata, nervis utrinsecus 10–15, venulis infra pulchre reticulatis. Flores umbellato-racemosi, 7–14; rhachis circiter 1 cm. longa, pedicelli 2.5–4 cm. longi, glandulis nigris subsessilibus densius conspersi. Calyx bene evolutus 6–12 mm. longus, late cupularis membranaceus irregulariter fissus nunc ad medium lobatus nunc fere ad imum partitus flavido- vel rubrido-coloratus; lobi ovati vel orbiculares glandulis nigris breviter pedicellatis crebre cincti, capillis albis hinc inde intermixtis. Corolla 5-loba, late campanulata, circ. 3.5–4 cm. longa, carnosula glabra laete flava, basi intus levissime kermesino-tincta, lobis orbicularibus 2.5–3 cm. diametro emarginatis. Stamina 10, inclusa, filamentis circ. 1.5 cm. longis glabris antheris 2.5 mm. longis brunneis. Ovarium conicum circ. 5 mm. longum glandulis nigris subsessilibus dense vestitum; stylus 2.5 cm. longus glandulis eisdem conspersus stigmate capitato lobatulo. Fructus maturus deest.

"China: Western Yunnan, at Doker La on the frontier of Tibet, in shrub and forest belt at 13,000-14,000 ft. Flowers large yellow." F. Kingdon Ward. No. 529.

"Western Yunnan, near A-tun-tsi, 12,000–13,000 ft." F. Kingdon Ward. No. 586.

"Shrub of 14–20 ft. Flowers slightly fleshy bright yellow with the faintest touch of crimson on interior at base. In rhododendron thickets in the mountains on the N.E. of the Yangtze bend. Lat. 27° 45′ N. Alt. 12,000 ft. July 1913." G. Forrest. No. 10,428.

This new species is very closely allied to *R. Souliei*, Franch., a widespread species extending from Szechwan to Yunnan. It is at once distinguished by the somewhat fleshy bright yellow flowers which are rather larger than those of *R. Souliei*. In structure and shape of leaf, in the glands on the pedicels and on the calyx, in the shape of the calyx, in the form and appearance of stamens and style, the two species are very much alike. In addition to the colour of the flower, *R. Wardii* is separated by the more elongate leaves which are never orbicular, and in the larger flowers with longer calyx.

Saussurea bullata, W. W. Sm. Sp. nov.

Haec species forma specieque foliorum ad *S. vestitam*, Franch. spectat sed habitu nano, inflorescentia foliis multo breviore inter alia recedit.

Planta 5–8 cm. alta, rhizomate longo perennans. Caulis brevis densius fulvo-pilosus. Folia 4–6, omnia radicalia vel subradicalia, 4–7 cm. longa, 3–5 cm. lata, ovata vel obovata vel suborbicularia, apice rotundata, basi late cuneata vel breviter cordatula, margine dentibus apiculatis remotius dentata, supra viridia bullata glabra, infra dense albo-pannosa, nervis conspicuis fulvo-tomentosis bene reticulatis. Inflorescentia corymboso-congesta; pedunculi capitulis breviores 5–10 mm. longi. Capitula 2–5, campanulata, 2 cm. longa vel paulo ultro, apice in sicco circ. 1 cm. lata; involucri phylla arcte adpressa, lanceolata, acuta vel subacuta, coriacea, 5-seriata, inferiora extus glabra, superiora ad apices sparse longiuscule albo-pilosa. Flores multi saturate coeruleo-purpurei circ. 1.5 cm. longi;

pappus albidus 1 cm. longus, pilis interioribus longe plumosis, exterioribus deficientibus. Achaenia (immatura) circ. 2 mm. longa, oblonga, glabra, rugosula, annulo membranaceo undulato coronata.

"Plant of 2–3 inches. Flowers deep bluish-purple. Stony alpine pasture on the eastern flank of the Lichiang Range. (Rare !) Lat. 27° 35′ N. Alt. 13,000 ft. September 1910." G. Forrest. No. 6653.

Sonerila yunnanensis, J. F. Jeffrey. Sp. nov.

Species ex affinitate S. *maculatae*, Roxb. et S. *laetae*, Stapf ; ab hac ex descriptione foliis ciliatis, petalis longioribus differt, ab illa indumento longiore et densiore, foliis haud maculatis recedit.

Herba semierecta 4–10 cm. alta. Caulis teres dense longiuscule glanduloso-pubescens (praesertim in parte inferiore). Folia late ovata ad suborbicularia, subacuta, symmetrica vel paulo asymmetrica, basi nonnunquam cordata, 2–8 cm. longa, 1.5–4 cm. lata, membranacea, haud maculata, saepe pagina inferiore purpurascentia, supra glanduloso-setulosa, infra ± dense glanduloso-pilosa praesertim ad costam nervosque, margine minute denticulata denticulis ciliatis ; nervi 3–5-paria, supra indistincti infra eminentes ; petiolus 1.5–3.5 cm. longus indumento denso flocculoso praeditus. Cyma terminalis contracta, 3–10-flora ; pedunculus 2–4 cm. longus ± glanduloso-ciliatus, pedicellis ad 4 cm. longis. Calyx oblongo-cylindricus 6 mm. longus, setulis patentibus glandulosis conspersus, dentibus brevibus acutis. Petala 1 cm. longa, lanceolata, acuminata, in sicco purpurea. Antherae sulphureae, rostrato-acuminatae, 5 mm. longae. Stylus 1 cm. longus, stigmate subcapitato. Capsula 8 mm. longa, oblonga, obscure sulcata, pedicello paulo longior, seminibus ovoideis minute punctulatis.

"Yunnan : Szemao, forest ravines, 4500 ft. Flowers pink." Henry 12,337.

Neighbourhood of Tengyueh, Howell 123.

Strobilanthes Dielsiana, W. W. Sm. Sp. nov.

Species ex affinitate S. *versicoloris*, Diels ; foliis coriaceis scabridis, staminibus perfectis duobus conspicua.

Planta 15–30 cm. alta. Caules e basi lignosa numerosi, 4–12, erecti, sparse foliati, scabriduli. Folia remota, sub regione inflorescentiae 1–2 paria, 2–5 cm. longa, 1.5–2 cm. lata, plus minusve late ovata, apice obtusa, basi rotundata vel late cuneata, coriacea, supra dense pustuloso-scabrida, costa pilosula, infra dense fulvo-araneoso-tomentosa, nervis 5–6-paribus eminentibus tomentosis ; margines scabridae ; petioli ad 3 mm. longi, pilosi. Flores magni subcapitati, in spiculam brevem densam terminalem conferti et ex axillis foliorum superiorum 2–3-nati brevissime pedunculati orientes. Bracteae ad 1.5 cm. longae, lanceolatae, acuminatae, foliaceae, scabridae, albo-ciliatae ; bracteolae circ. 1 cm. longae, lineares, scabridulae, albo-ciliatae. Sepala bracteolis subsimilia et aequilonga, lineares vel angustissime lanceolatae, longius albo-ciliatae. Corolla multo exserta, ad 3.5 cm. longa, e basi angusta tubulosa circ. 1.5 cm. longa subito ventricoso-ampliata, ore subaperto nec decurvato, purpureo-coerulea, extus glabra, intus lineis sparse albo-pilosis pererrata. Stamina perfecta duo filamentis glabris. Stylus pilis albis patentibus undique praeditus ; ovarium apice pilosula excepta glabrum. Fructus maturus deest.

" Plant of 6–12 inches. Flowers purplish-blue. Dry stony situations amongst scrub on the eastern flank of the Lichiang Range. Lat. 27° 25′ N. Alt. 10,000 ft. August 1910." G. Forrest. No. 6264.

Styrax langkongensis, W. W. Sm. Sp. nov.

Species affinis *S. rugoso*, Kurz ; habitu, foliis, calycis dentibus, corollae magnitudine, filamentis satis differt.

Frutex parvus erectus 0.3–1.2 m. altus fide collectore ; rami subteretes juniores dense stellato-fulvi-tomentosi, serius glabrescentes. Folia alterna, petiolata petiolo 1–3 mm. longo dense tomentoso, obovata vel elliptica, 2–4 cm. longa, 1–2 cm. lata, apice breviter acuminata vel obtusa vel etiam subrotundata, basi rotundata vel late cuneata, subcoriacea, in parte superiore minute serrata, interdum subintegra, supra atroviridia minute albido-stellato-tomentella, subtus tomento denso griseo vestita, supra nervis immersis, subtus prominentibus 4–5-paribus fulvo-tomentosis. Inflorescentia racemosa, ad medium plerumque foliata, circ. 4 cm. longa, axillaris vel terminalis, 4–5-flora ; bracteae 4–8 mm. longae, lineares, tomentosae ; rhachis dense fulvo-stellato-tomentosa. Flores albidi, 1.5–2 cm. longi, pedicello 3–4 mm. longo, dense stellato-tomentoso. Calyx cupuliformis, 5–6 mm. altus, in sicco 5 mm. latus, margine truncatus, 5-denticulatus, dentibus 1–1.5 mm. longis irregularibus, linearibus vel anguste triangularibus, extus densissime fulvo-tomentosus, intus ore sparse pilosulus cetera glaber. Corolla 5-partita, tubo 3 mm. longo lobis multo breviore, lobis in aestivatione imbricatis membranaceis 1.5–1.8 cm. longis 5–6 mm. latis spathulatis extus dense stellato-tomentellis intus parcius. Stamina 10, filamentis parte libera antheras subaequantibus per tres partes inferiores pilosis, antheris circ. 5 mm. longis pilis stellatis adspersis. Ovarium superum tomentosum stylo glabro antheris longiore.

" Dwarf shrub of 1–4 ft. Flowers creamy white. Dry open stony pasture in the hills at the south end of the Lang-kong Valley. Lat. 26° 10′ N. Alt. 7000–9000 ft. May 1910." G. Forrest. No. 5585.

Tovaria Forrestii, W. W. Sm. Sp. nov.

Species ex affinitate *Tovariae Delavayi*, Franch.

Planta circ. 60 cm. alta. Caulis flexuosus glaberrimus, polyphyllus. Folia ad 17 cm. longa, ad 8 cm. lata, elliptica vel ovato-elliptica, basi amplexicaulia, cordata lobulis imbricatis, petiolo nullo, apice longe acuminata, tenuiter membranacea, utrinque glabra, infra pallidiora. Inflorescentia composita, in specimine viso in racemos tres elongatos tenues flexuosos 20–30-floros divisa; rhachis furfuroso-pubescens; bracteae lineares circ. 2 mm. longae; pedicelli 3–4 mm. longi, furfuroso-pubescentes. Flores flavidi fragrantes; perianthium 5–6 mm. longum fere ad basin in lobos lanceolatos acutos partitum. Stamina in parte tertia inferiore segmentorum inserta, filamentis brevissimis. Ovarium globosum; stylus columnaris ovarium subaequans, apice obscure trilobus.

" Plant of 2 ft. Flowers dull yellow, shaded maroon, fragrant. Open and shady mixed forests on the eastern flank of the Tali Range. Lat. 25° 40′ N. Alt. 9000–10,000 ft. July 1910." G. Forrest. No. 7066.

A species well distinguished by the cordate amplexicaul leaves without petioles, by the deeply cleft perianth, and by the columnar style with shortly 3-lobed apex.

Tovaria lichiangensis, W. W. Sm. Sp. nov.

Species ex affinitate *Tovariae Fargesii*, Franch. et *T. Souliei*, Franch. sed foliis utrinque albo-pilosulis, margine ciliatis inter alia ex descriptione recedit.

Planta 10–15 cm. alta, rhizomate gracili elongato, fibris tomentellis. Caulis gracilis flexuosus infra glaber, supra pilis parvis reflexis albidis plus minusve dense indutus. Folia 3–4, in medio caule approximata, petiolo 5–15 mm. longo semiamplectante praedita; lamina 3–4.5 cm. longa, 2–2.5 cm. lata, ovata vel ovato-elliptica, basi late cuneata, apice breviter atque acute acuminata, utrinque sparsius albo-pilosula, infra saepe glabrescens, margine breviter albo-ciliata. Inflorescentiae rhachis 6–8 cm. longa, simplex, 2–5-flora; bracteae parvae, ovatae, fuscae ; pedicelli flore breviores ; flores albi fragrantes. Perianthium 7–8 mm. longum membranaceum, paulo ultra medium in lobos ovatos obtusos partitum. Stamina ad tubi fauces inserta antheris albidis filamenta paulo complanata fere aequantibus. Ovarium globosum ; stylus ovario paulo longior apice breviter trilobus.

" Plant of 3–6 inches. Flowers pure white, fragrant. Shady situations in pine and rhododendron forests on the western flank of the Lichiang Range. Lat. 27° 20′ N. Alt. 12,000–13,000 ft. June 1910." G. Forrest. No. 5801.

Trachydium spatuliferum, W. W. Sm. Sp. nov.

Species valde affinis *Trachydio Delavayi*, Franch. ; magnitudine habitu foliis proxima, bracteolis diversissima.

Planta 5–20 cm. alta, erecta glabra. Rhizoma crassum. Caules solitarii vel plures, basi fibris petiolorum pristinorum cincti. Folia plurima ex imo caule orta, petiolo basi conspicue late vaginante circ. 2–4 cm. longo praedita, glaberrima ; lamina 3–4 cm. longa, 1–1.5 cm. lata, ambitu oblonga, pinnata ; segmenta utrinque 3–4, late ovata vel suborbicularia sessilia circ. 7–8 mm. diametro, apice basique subrotundata, margine paucies serrata vel subintegra. Involucri phylla foliacea, 4–5, foliis persimilia, petiolo vaginante incluso ad 5 cm. longa. Umbellae radii 10–20 inaequales sub anthesi 3–9 cm. longi. Involucelli phylla 4–6, variabilia, 8–12 mm. longa, flores superantia, saepius lineari-spathulata, integra vel 3–5-fida, segmentum supremum semper maximum, lateralia saepius minima linearia. Sepala inconspicua. Petala flavido-viridia ex collectore, subelliptica circ. 1.5 mm. longa, apice inflexo. Ovarium nitenti-atroviride viscidum.

" Plant of 2–8 inches. Corolla yellowish-green, gynaeceum dark green, viscid, and shining. Open stony pasture on the eastern flank of the Lichiang Range. Lat. 27° 30′ N. Alt. 11,000–12,000 ft. July 1910." G. Forrest. No. 6019.

Vaccinium modestum, W. W. Sm. Sp. nov.

Species haec nana inter species hujus regionis cognitas flore solitario facile recognoscitur.

Fruticulus minimus ; pars epigaea 3–8 cm. longa ; rhizoma repens gracile. Caulis suberectus basi defoliatus et decorticans, supra laxius foliatus glaber rubridus. Folia pauca (4–8), 2–3 cm. longa, 1–1.6 cm. lata, ovata vel elliptica vel obovata, apice rotundata vel obtusissima raro emarginata, basi rotundata vel late cuneata, tenuiter coriacea, integra, glabra, supra viridia infra subglaucescentia, nervis utraque facie conspicuis bene reticulatis ; petioli brevissimi vel fere nulli. Flores solitarii in axillā folii supremi orti, rarius duo in eodem ramulo, subcernui, pedicellis usque ad 3 cm. longis glabris rubridis suffulti ; bracteolae duae conspicuae sub flore positae circ. 8 mm. longae 5–6 mm. latae, ovatae vel suborbiculares foliaceae virides purpureo-suffusae pulchre reticulatae. Calycis lobi deltoidei 1 mm. longi, 2 mm. lati, rubro-purpurei. Corolla globosa circ. 4 mm. longa, fere ad medium in lobos ovatos apice rotundatos leviter recurvatos fissa, in sicco rubro-purpurea. Stamina 10 filamentis 2 mm. longis glabris, antheris 1.5 mm. longis tubulis 2 mm. longis praeditis, aristis duabus 2 mm. longis subulatis rigidis. Ovarium circ. 4 mm. longum, glabrum. Fructus deest.

China :—Western Yunnan near the Doker La. Alt. ? F. Kingdon Ward. No. 1023A in Herb. Edin.

A pretty dwarf species suggesting a single-flowered *Pyrola* in habit.

6204

Dracocephalum Isabellae, G. Forrest. Sp. nov.

Species pulcherrima affinis *D. tangutico*, Maxim. quod foliis approximat sed floribus multo differt ; statura habituque *D. argunense*, Fisch. proximum est sed foliis integris antheris villosis inter alia signa separatur.

Herba perennis caulibus gracilibus simplicibus 30–50 cm. altis apud angulos dense longiuscule albo-crispato-villosis. Folia ad 2.5 cm. longa vix petiolata potius vaginulata fere ad basin in 5–7 segmenta linearia pedatim partita in memoriam ea *D. tangutici*, Maxim. revocantia ; segmenta 1.5–2 cm. longa 1–2 mm. lata apice obtusiuscula subcoriacea integra plus minusve revoluta supra atroviridia sparse pilosula infra pallidiora minute nitenti-glanduloso-punctata in costam pilis adpressis hispida ; vaginula densiuscule albo-villosa ; in axillis superioribus inveniuntur ramuli abbreviati foliosi. Verticillastri 4–6-flori approximati inflorescentiam spiciformem 8–10 cm. longam formantes. Bracteae inferiores foliis subsimiles sed minores, superiores 1.5 cm. longae pedatim 3–5-partitae vel -lobatae extus atropurpureae plus minusve albo-pilosulae segmentis apice subspinescentibus margine longiuscule albo-ciliatis ; bracteolae lanceolatae vel trifido-oblanceolatae bracteis subaequilongae vel paulo minores ; pedicelli ± 5 mm. longi densissime albo-villosi. Calyx 1.5–1.7 cm. longus tubuloso-campanulatus extus dense albo-villosus intus glaber dentibus 4–5 mm. longis triangularibus subspinescentibus longe albo-ciliatis. Corolla 3.5–4 cm. longa saturate caeruleo-purpurea extus capillis pluricellularibus purpureis praesertim in galeam eximie ornata intus glabra ; tubus curvatus infra 2 mm. latus superne gradatim ampliatus ventricosus circ. 1 cm. latus; labium superum oblongo-ellipticum galeatum 8 mm. longum integrum extus pulcherrime purpureo-villosum; labium inferum patens circ. 1.2 cm. longum lobo medio reniformi fere 1 cm. lato margine pulchre erosulo utrinque glabro lobis lateralibus subrotundatis medio minoribus extus villosis. Stamina e tubo exserta labio supero paulo breviora filamentis purpureo-villosis antheris glabris. Nuculae desunt.

"Plant of 12–20 inches. Flowers deep blue-purple. Open stony limey pasture on the mountains of the Chungtien plateau. Lat. 27° 30′ N. Alt. 12,000 ft. July 1914." G. Forrest. No. 12,789.

It is to be hoped that this very beautiful species will be introduced to European gardens. The plant is dedicated to Miss Isabella Forrest, the sister of the collector.

Pertya monocephala, W. W. Sm. Sp. nov.

Species valde affinis *P. phylicoidi*, J. F. Jeffrey a qua capitulis solitariis terminalibus longe pedunculatis majoribus inter alia distinguitur; *P. Bodinieri*, Vaniot ex descriptione inflorescentiā amplā capitulis unifloris maxime recedit.

Fruticulus 30–60 cm. altus. Ramuli rigidi virgati plus minusve scabridi. Folia circ. 5 mm. longa, 3–5-fasciculata, ita revoluta ut linearia videantur, apice spinescentia, supra subglabra vel sparsius araneoso-villosa, infra dense albo-sericea, pulvinis sericeis inserta. Capitula solitaria, ramulos terminantes, usque ad 2 cm. pedunculata, circ. 2.5 cm. longa, medio circ. 1.5 cm. lata, 7–10-flora. Involucri phylla pluriseriata lanceolata, longiuscule acuminata apiculata, membranacea, pallido-viridia, exteriora 5–10 mm. longa, margine albido-scariosa atque fulvido-araneoso-villosula, interiora usque ad 2 cm. longa, subglabra. Corolla fere 2 cm. longa, alte 5-fida, segmentis linearibus circ. 5 mm. longis. Antherae basi longe caudatae. Achaenia circ. 4 mm. longa, oblonga, densissime albo-sericea. Pappi setae simplices rigidiusculae scabridae albidae 1.5 cm. longae vel ultro.

"China:—Jalung, Oui-chu Valley, Western Yunnan; at an elevation of 9000–10,000 ft. Shrub of 1–2 ft. January 1914." F. Kingdon Ward. No. 1141. (Also found, according to Mr. Ward, in the arid region of the Salween and Mekong Valleys.)

The present species shows a close affinity in foliage to *Pertya phylicoides*, J. F. Jeffrey, of the same region but differs much in the inflorescence.

Three Indo-Burmese Rhododendrons.

BY

J. H. LACE,
Late Chief Conservator of Forests, Burma,

AND

W. W. SMITH, M.A.,
Assistant Keeper, Royal Botanic Garden, Edinburgh.

With Plates CXXXIX–CXLI.

ADDITIONS to the Rhododendron Flora of the Indo-Burmese Empire have been scanty indeed since the days of Hooker and Clarke. The study of the East Himalayan types was pursued with such thoroughness and tenacity by Hooker that no additions have been made in that area to the number of species found and described for the most part by him in the middle of last century. The three species of which descriptions are given below were not all previously unknown—two were very imperfectly known, and the third is new. The most interesting of the three is perhaps *R. Parishii*, C. B. Clarke, of which a brief description was given by Clarke in the Flora of British India, vol. iii, p. 475. Clarke, however, had neither flowers nor fruit. A recent collection, made in 1912 from the same mountain on which Parish collected the original specimens, fortunately contains both flowers and fruit, so that a full description has been made possible. *R. Elliottii*, Watt mss., is from Manipur, and has already been briefly commented upon by Brandis in his Indian Trees, p. 410, where he takes up Watt's manuscript name and gives a short diagnosis in English. *R. Kyawi*, Lace et W. W. Sm., is a distinct new species allied to *R. Elliottii*, Watt mss., and was discovered by a young Burmese forest officer. Its discovery and its close affinity to *R. Elliottii*, Watt mss., have necessitated a full description of the latter species.

Rhododendron Parishii, C. B. Clarke, descr. ampl. J. H. Lace.
Plate CXXXIX.

Species ex affinitate *R. fulgentis*, Hook. f. sed foliis mox glabris floribus multo tenuioribus fructu tomentoso inter alia differt.

Arbor parva, 6–8 m. alta; rami crassi juniores dense ferrugineo-lanati, mox glabri, vetustiores cinerei decorticantes. Folia apices ramulorum versus aggregata, angustius obovata ad elliptico-obovata, apice breviter obtuse acuminata, basi cuneata ad rotundato-cuneata, usque ad 11.5 cm. longa et 6 cm. lata, coriacea, juventute pagina inferiore simul ac petiolo ramulisque laxius ferrugineo-lanata, mox glabra, costa subtus valde prominente supra impressa, nervis lateralibus utrinque 10–12 subtus prominentibus, pagina inferiore arctius graciliter reticulata, petiolo valido 1.2–2.5 cm. longo supra canaliculato mox glabro suffulta. Inflorescentia corymbiformis, 6–12-flora; pedicelli sub anthesin 1–1.5 cm. longi, fructu maturo ad 2.5 cm. longi, dense glandulosi atque ferrugineo-tomentosi. Calyx parvus, vix 1 mm. longus, undulato-lobatulus, glanduloso-pubescens, in fructu in discum lignosum 5–6 mm. diametro auctus. Corolla sanguinea, campanulata, circiter 3.5 cm. longa et 3 cm. diametro; tubus 2 cm. longus vel ultro, basi 5 mm. latus, usque ad 2 cm. sensim ampliatus extus intusque glaber; lobi 5, rotundati, usque ad 1.5 cm. diametro, glabri. Stamina 10, inclusa, inaequalia, longiora circ. 2.5 cm. longa, filamentis glabris, antheris 2 mm. longis ochraceis. Ovarium tomento brevi nitenti dense tectum; stylus ad 3.5 cm. longus, pilis papillosis glandulosis, superne densius, instructus. Capsula usque ad 2.5 cm. longa et 0.8 cm. diametro, robusta, cylindrica, parum curvata, alte 6-sulcata, tomento ferrugineo denso detersili praedita, stylo saepe persistente; semina numerosa circ. 1.5 mm. longa, fusiformi-oblonga apice basique fibris minimis instructa, brunnea.

Burma:—Moolee (Muleyit), alt. 6000 ft. Parish 1021 in Herb. Kew.; Muleyit Peak in the Dawna Range in the Amherst district, at an elevation of 6200 ft.; 27th January 1912; Lace 5637 in Herb. Kew. et Herb. Edin. et Herb. prop.

Rhododendron Elliottii, Watt mss. ex Brandis Indian Trees, p. 410 (*anglice* breviter descriptum), desc. amplif. W. W. Sm. Plate CXL.

Species affinis *Rhododendro Kendrickii*, Nutt.; foliis, gemmis, ovario dense rufo-stellato-tomentello nec strigoso inter alia discrepat.

Arbor parva ramosissima; altitudo non nota; rami crassiusculi glabri, vetustiores cinerei mox decorticantes; gemmae ovoideae 2–3 cm. longae obtusae perulis exterioribus ovatis vel ovato-lanceolatis acumine longissimo vel nonnunquam brevi praeditis, interioribus suborbicularibus utrinque dense sericeis. Folia 7–14 cm. longa, plerumque 8–9 cm., 3–5.5 cm.

lata, petiolo 1.5–2.5 cm. longo valido glabro praedita, elliptico-oblonga, apice acuta indurato-apiculata, basi late cuneata vel subrotundata, coriacea, utrinque glabra, supra viridia nitida, infra pallidiora distincte et minute reticulata; costa media supra impressa subtus multo elevata, nervis utrinsecus 10–12 supra indistinctis. Inflorescentia similis ei *Rhododendri Kendrickii*, Nutt., rhachide crassa paulo elongata, floribus 6–15 subcapitatis inodoris, pedicellis ± 1 cm. longis dense minute glandulosis. Calyx late cupularis 3–4 mm. longus undulato-lobatulus subcoriaceus in fructu persistens puberulus glandulosus. Corolla 5–5.5 cm. longa, ore circ. 4.5 cm. lata, infundibuliformis carnosula nitida saturate roseo-purpurea saturatius maculata (ex collectore); tubus fere 4 cm. longus, basi 1 cm. latus, usque ad 4 cm. sensim ampliatus, extus intusque glaber; lobi 5, circ. 1.5 cm. diametro, suborbiculares, aequales, apice breviter vel vix emarginati, venis tribus parallelis nec divergentibus sublucidis pererrati. Stamina 9–10 inaequalia, longiora fere 4 cm. longa, filamentis compressis glabris, antheris ovoideis 2–3 mm., longis. Ovarium oblongum 6–7 mm. longum dense rufo-stellato-tomentellum stylo stamina longiora paulo superante sparse pilis minutis stellatis praedito, stigmate capitato. Fructus oblongus 1.5–2 cm. longus, 5–6 mm. latus, sulcatus rufo-tomentellus, tandem glabrescens, in valvas sex erectas dehiscens; semina delapsa.

Munipur:—On Japoo, Naga Hills, at an elevation of 9000 ft., Watt 6893 in Herb. Kew. et Herb. Watt. Coll. May 1882. *Type.*

Attached to the type-sheet is the following field-note:—"At this elevation this forms a leading plant now in bloom with its large deep rose purple flowers. Leaves green shining, prominently reticulate below. Flower buds round with a few long acuminate bracts like the ear of a rosebud. Flowers in head 10–15, not at all scented. Bracts large rufous hairy obtuse. Pedicels shortly hairy ½ inch long. Calyx a largish free ring 6-angled. Corolla tubular shining deep rose purple, all petals alike with deeper spots, imbricate rounded with three subtransparent parallel veins not spreading; not at all scented. Stamens with deep brown anthers. Old fruits bursting into six erect valves, brown hairy in last year's specimens. No seeds could be procured. I propose to call this glorious plant in honour of Mr. Elliott."

Same locality, 9000–10,000 ft. Watt 6210, coll. Jan. 1882 in Herb. Kew. et Herb. Watt.; 8000–9000 ft. Watt 6211, coll. March 1882, *ibid.* "A small tree much branched with bright green shining leaves, pale green much reticulated below. Flower buds ovate green, the outer bracts much acuminate erect.

Fruit long linear bursting into 6 carpels with calyx forming a ring; near *R. Griffithianum*."

Watt 11,463 in Herb. Kew. without note of elevation.

Collected as far back as 1882, this very distinct species has remained undescribed except for a very brief English diagnosis by Brandis in his Indian Trees, p. 410. Of the Himalayan species it comes nearest to *R. Kendrickii*, Nutt., and nearer to the cultivated form of that species (Bot. Mag. 5129) than to the original Bhutan types. In allocating it among the species with small or indistinct calyx lobes we are in accordance with Brandis; Watt suggests above an affinity with *R. Griffithianum*, Wight; the calyx is of that intermediate magnitude which cannot be described as obsolete, nor on the other hand as dilated. There are abundant differences between *R. Elliottii*, Watt, and its nearest ally, *R. Kendrickii*, Nutt., in the shape, consistence, and reticulation of the leaves, in the shape of the buds, and especially in the ovary.

Rhododendron Kyawi, Lace et W. W. Sm. Sp. nov.
Plate CXLI.

Species ex affinitate *Rhododendri Elliottii*, Watt mss., supra amplius descripti; foliis multo majoribus anguste elliptico-obovatis apice rotundatis nec acutis recedit; floribus rubro-purpureis (in sicco), ovario dense rufo-stellato-tomentello appropinquat; haud procul a *R. Kendrickii*, Nutt., quod foliis lanceolatis acuminatis inter alia differt.

Arbor mediocris ex collectore burmanico *Maung Kyaw*; rami crassi glabri, vetustiores cinerei. Folia 20–25 cm. longa, 6.5–7.5 cm. lata, petiolo 5 cm. longo valido glabro praedita, anguste elliptico-obovata (fere elliptica), apice rotundata indurato-apiculata, basi cuneata, atro-viridia, minute elevato-reticulata, infra pallidiora; costa supra impressa, subtus multo elevata, nervis utrinsecus 16–20 supra vix impressis. Inflorescentia similis eis specierum supra citatarum; in specimine unico rhachis crassa ad 5 cm. elongata, floribus circ. 14 racemose dispositis, bracteis gemmae paucis superstitibus 2–3 cm. longis lineari-lanceolatis dense utrinque cinereo-sericeis, basi inflorescentiae adhaerentibus, pedicellis 2–2.5 cm. longis, plus minusve stipitato-glandulosis. Calyx late cupularis 2–3 mm. longus indistincte undulato-lobatulus firmus persistens albo-puberulus stipitato-glandulosus. Corolla 4.5–5 cm. lata, infundibuliformis, carnosula, rubro-purpurea (ut in sicco videtur); tubus circ. 3 cm. longus, basi 1 cm. latus, ad 3–3.5 cm. sensim ampliatus, extus sparse albo-pilosolus intus sparsius; lobi 5, circ. 1.5 cm. diametro, suborbiculares, apice breviter emarginati. Stamina

9–10 inaequalia, longiora 3.5–4 cm. longa, filamentis compressis infra medium albo-pilosulis, supra glabris, antheris ovoideis 3 mm. longis ochraceis. Ovarium conicum 6–7 mm. longum, dense rufo-stellato-tomentellum, stylo stamina longiora paulo superante sparse pilis minutis stellatis praedito, stigmate capitato vix lobato. Fructus deest.

Burma :—Kachin Hills, 1 mile beyond Paypat bungalow, at an elevation of 6000 feet in evergreen forest. The local name in Măru dialect is Pain San. Maung Kyaw 36 in Herb. Kew.

This Burmese species is at first sight very different from *R. Elliottii*, Watt, but on analysis it is found to be very closely allied. The large obtuse leaves and the pilose stamens are the chief marks of distinction. The flowers of these three species, *R. Kendrickii*, Nutt., *R. Elliottii*, Watt, and *R. Kyawi*, Lace et W. W. Sm., occurring in three isolated areas—Bhutan, Naga Hills, and Kachin Hills—are remarkably alike in size, lobing, and colour ; the differences in other respects are enough for specific distinction, but the many similarities suggest origin from the same ancestral stock. The new species is named after Maung Kyaw, Burma Forest Service, who has collected valuable specimens of trees, etc., in the neighbourhood of Myitkyina under the superintendence of Mr E. M. Buchanan of the same service.

LIST OF PLATES

Illustrating J. H. Lace and W. W. Smith's paper on Three Indo-Burmese Rhododendrons.

PLATE CXXXIX.—R. Parishii, C. B. Clarke. In Herb. Lace.
CXL.—R. Elliottii, Watt mss. In Herb. Edin.
CXLI.—R. Kyawi, Lace et W. W. Sm., in Herb. Kew. A unique sheet, presented by J. H. Lace.

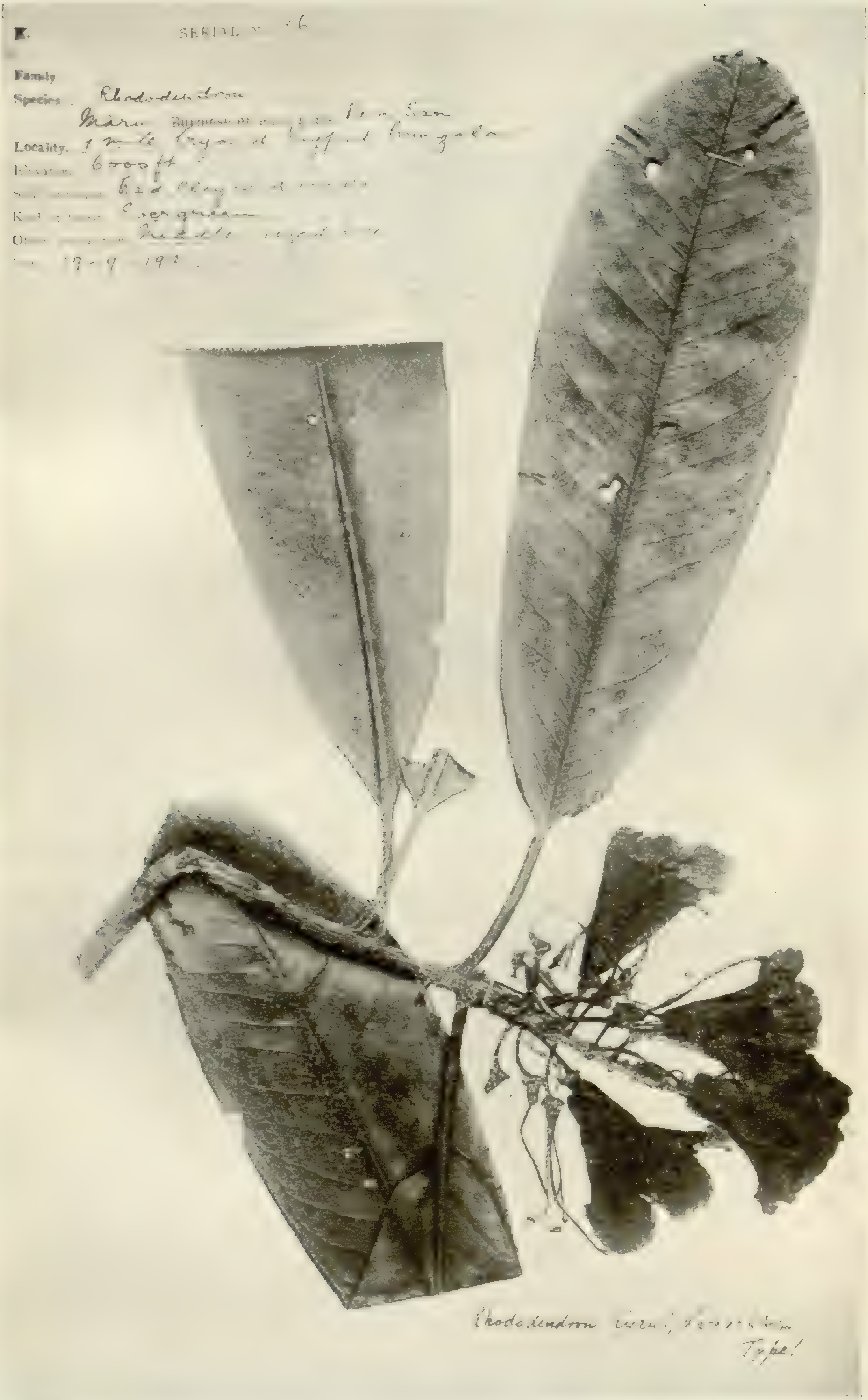
The plates are taken from photographs by Mr. R. M. Adam of dried specimens.

Rhododendron Parishii, Clarke

RHODODENDRON PARISHII, CLARKE.

FLORA OF MUNIPUR
Rhododendron
Elliottii Watt.
No. 6893
Naga Hills
9000 FT. DATE
COLLECTED
During the Government Demarcation Survey of 1881-82
By GEORGE WATT.

RHODODENDRON ELLIOTTII, WATT.


SERIAL
Family
Species
Rhododendron
Locality.
6000 ft
Evergreen
Type!

RHODODENDRON KYAWI, LACE ET W. W. SM.

Puccinia Prostii, Moug., and Uromyces Scillarum, Wint.

Two Rust Fungi from the Royal Botanic Garden, Edinburgh.

BY

MALCOLM WILSON, D.Sc., F.L.S.,
Lecturer in Mycology, University of Edinburgh.

With Plates CXLII–CXLIII.

Puccinia Prostii, Moug.

Puccinia Prostii, Moug., has been recently recorded in Britain by Massee* on cultivated tulips, but no particular locality is given. Saccardo † states that it occurs on *Tulipa sylvestris*, Linn., and on *T. australis*, Link (*T. Celsiana*, DC.) in Italy and France.

This rust was recently found in the Royal Botanic Garden attacking a bed of *Tulipa sylvestris* and doing considerable damage to the plants which produced few flowers. The rust was present on the plants in 1913, and probably also in the previous years.

The sori, which occur on both surfaces of the leaf, are usually confined to one longitudinal half of the lamina (see Pl. cxlii), frequently on that portion directed towards the north. There is no discoloration of the leaf around the sori. In addition to teleutospores, spermogonia are abundantly produced on the leaves, although in the descriptions of the fungus given by Saccardo,† Sydow,‡ and Massee,* there is no mention of these. Two kinds of markings are obvious on the leaves :—

(1) Yellowish-brown areas, elliptical or circular in shape, in which the epidermis is apparently unbroken (*a*, Pl. cxliii, Fig. 1).

(2) Grey or slate-coloured, usually spindle-shaped, areas, many of which show a longitudinal slit from which the brownish-black masses of teleutospores are projecting (*b*, Pl. cxliii, Fig. 1).

It appears that the spermogonia are first produced and give rise to the yellowish-brown spots, and that later on teleutospores are formed on the same sorus. In the early stages of develop-

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* G. Massee, assisted by I. Massee, Mildews, Rusts, and Smuts (1913), p. 139.

† Saccardo, Sylloge Fungorum, vii (1888), p. 732.

‡ Sydow, P. et H., Monographia Uredinearum, i (1904).

[Notes, R.B.G., Edin., No. XXXVIII, Sept. 1914.]

ment the areas remain yellowish-brown, but as the teleutospores approach maturity an air-space develops under the epidermis, and in consequence grey or slate-coloured spots are produced. The epidermis finally splits longitudinally, the edges turn slightly back and disclose the dark brown mass of teleutospores. It is frequently found that a slate-coloured area forms a circular or spindle-shaped ring around a yellowish-brown spot (*c*, Pl. cxliii, Fig. 1). It is evident that in these cases the development is centrifugal, the ripe teleutospores being first produced in the outer part of the sorus. It is quite possible that, in some cases, only spermogonia are developed in the area, and then the yellowish-brown colour remains unchanged. Spots have, however, been often found in which spermogonia and groups of young teleutospores are intermingled; and it is probable that, in the majority of cases, development commences with the formation of spermogonia and terminates in the production of teleutospores. Teleutospore sori, not in connection with spermogonia, have also been found. The mycelium, which is easily seen in a section of the leaf, consists of rather large hyphae, containing yellowish-brown granules. The spermogonia are amphigenous, yellowish-brown in colour, and flask-shaped, with slightly projecting necks, 120–140 μ in diameter (Pl. cxliii, Fig. 2). The spermatia are oval and unusually large, about 10 × 5 μ. The teleutospore sori are amphigenous (Pl. cxliii, Figs. 3, 4); spores brown, scarcely constricted, covered with rather long hyaline spines 56–62 × 17–19 μ; epispore rather thick, 2–3 μ; pedicels variable, shorter or longer than the spore, up to 80 μ in length, hyaline, deciduous.

Uromyces Scillarum, Wint.

Uromyces Scillarum, Wint., the common *Scilla* rust, has been recorded on several species of *Scilla* and *Muscari*. In the British Isles it is frequently found on *Scilla festalis*, Salisb., and also occurs on *Scilla bifolia*, Linn., and *S. hispanica*, Mill.; up to the present, however, its occurrence on *Muscari* has not been recorded in this country.

It was found in the Royal Botanic Garden in May, forming the characteristic yellow spots on the leaves of *Muscari polyanthum*, Boiss., a species which hitherto has not been recorded as a host for this rust. As usual, the sori are often concentrically arranged on the rounded discoloured areas. The teleutospores, the only kind of spore produced, agree in size and form with those found on the other host species; in size they vary from 20–26 × 16–18 μ. The characteristic faint lines found on the spore wall running from the apex to base can be frequently seen.

The rust frequently occurs on neighbouring plants of *Scilla* *festalis,* but has not been discovered on *S. hispanica* or on several other species of *Muscari* growing in proximity to the diseased *M. polyanthum.*

Uromyces Ornithogali, Hazsl. which also occurs on *Muscari* sp., but which has not yet been recorded for Britain, is distinguished by the larger teleutospores bearing a hyaline apiculus.

I wish to express my thanks to Mr. W. B. Grove, who kindly confirmed the naming of the two species.

EXPLANATION OF PLATES CXLII–CXLIII.

Illustrating Dr. Malcolm Wilson's paper on Puccinia Prostii, Moug.

All the photographs refer to *Puccinia Prostii*, Moug.

PLATE CXLII.—Three leaves of *Tulipa sylvestris*, L. attacked by the fungus. The two leaves on the left show the upper surfaces, and the one on the right the under surface. About ¾ natural size.

PLATE CXLIII.

FIG. 1.—Portion of a leaf attacked by the fungus. *a*, yellowish-brown areas in which spermogonia and young teleutospores are present. *b*, mature teleutospore sori. *c*, ring-shaped mature teleutospore sorus surrounding young teleutospores and spermogonia. About 1⅓ times natural size.

FIG. 2.—Transverse section of leaf of *Tulipa sylvestris* showing spermogonia. × about 25.

FIG. 3.—Transverse section of leaf of *Tulipa sylvestris* showing amphigenous teleutospore sori. × about 70.

FIG. 4.—Transverse section of leaf of *Tulipa sylvestris* showing part of teleutospore sorus. × about 165.

The plates are taken from photographs by Mr M. Y. Orr and Mr R. M. Adam of living specimens and preserved material in the Royal Botanic Garden, Edinburgh.

PUCCINIA PROSTII MOUG.

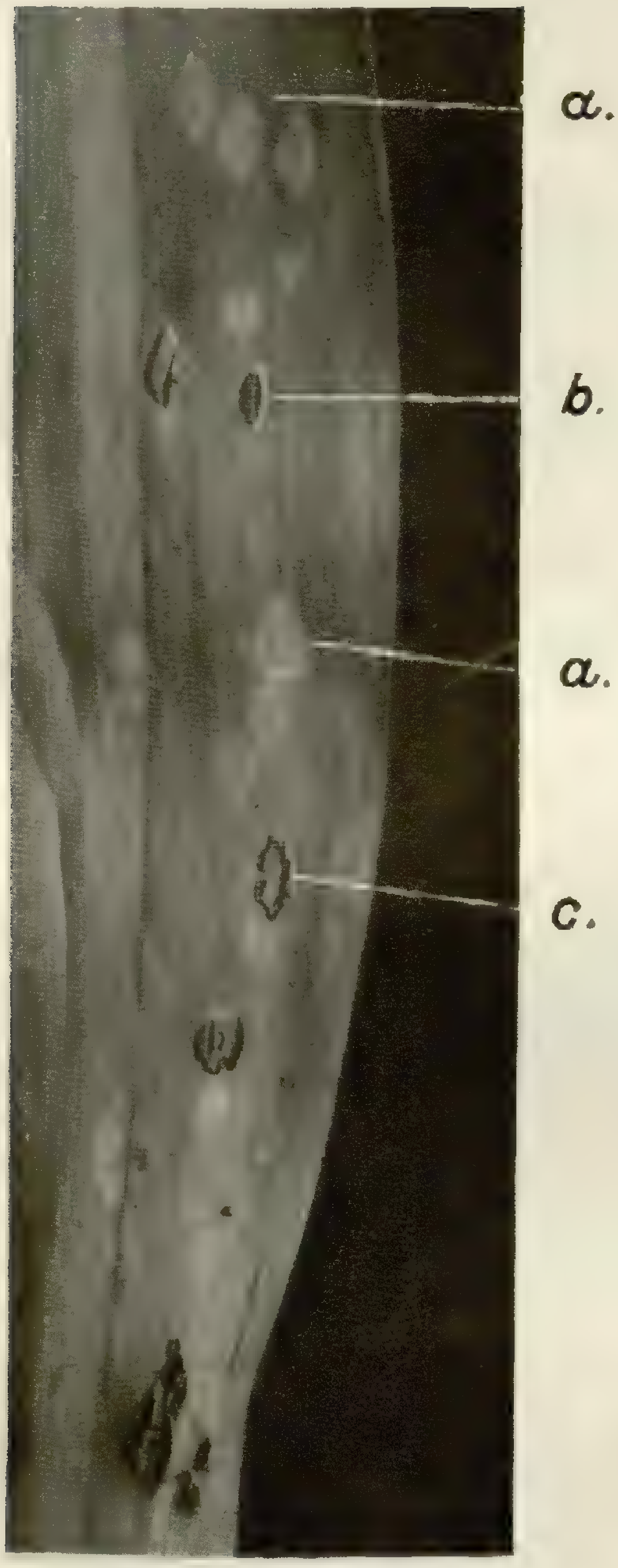

FIG 1.

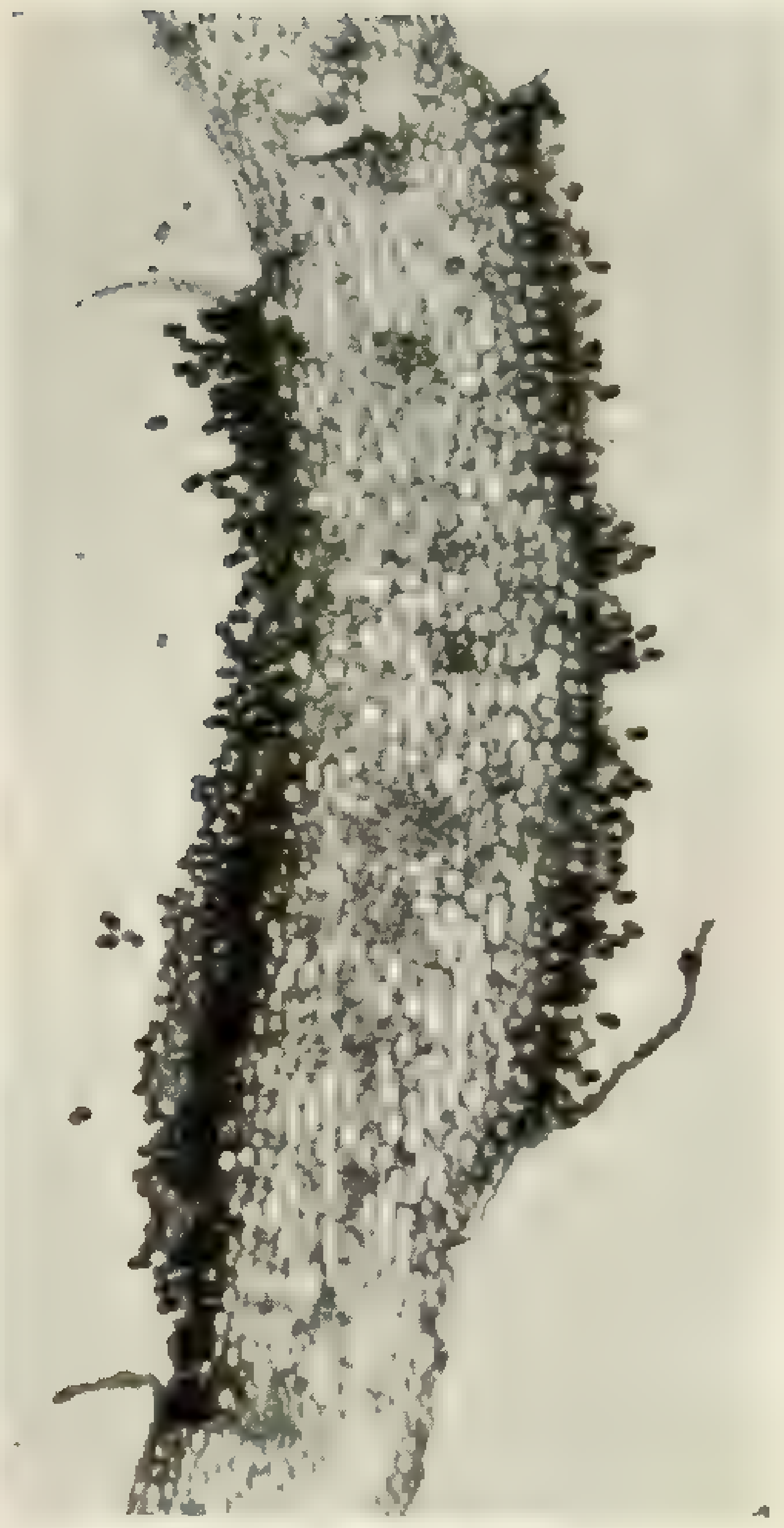

FIG. 3

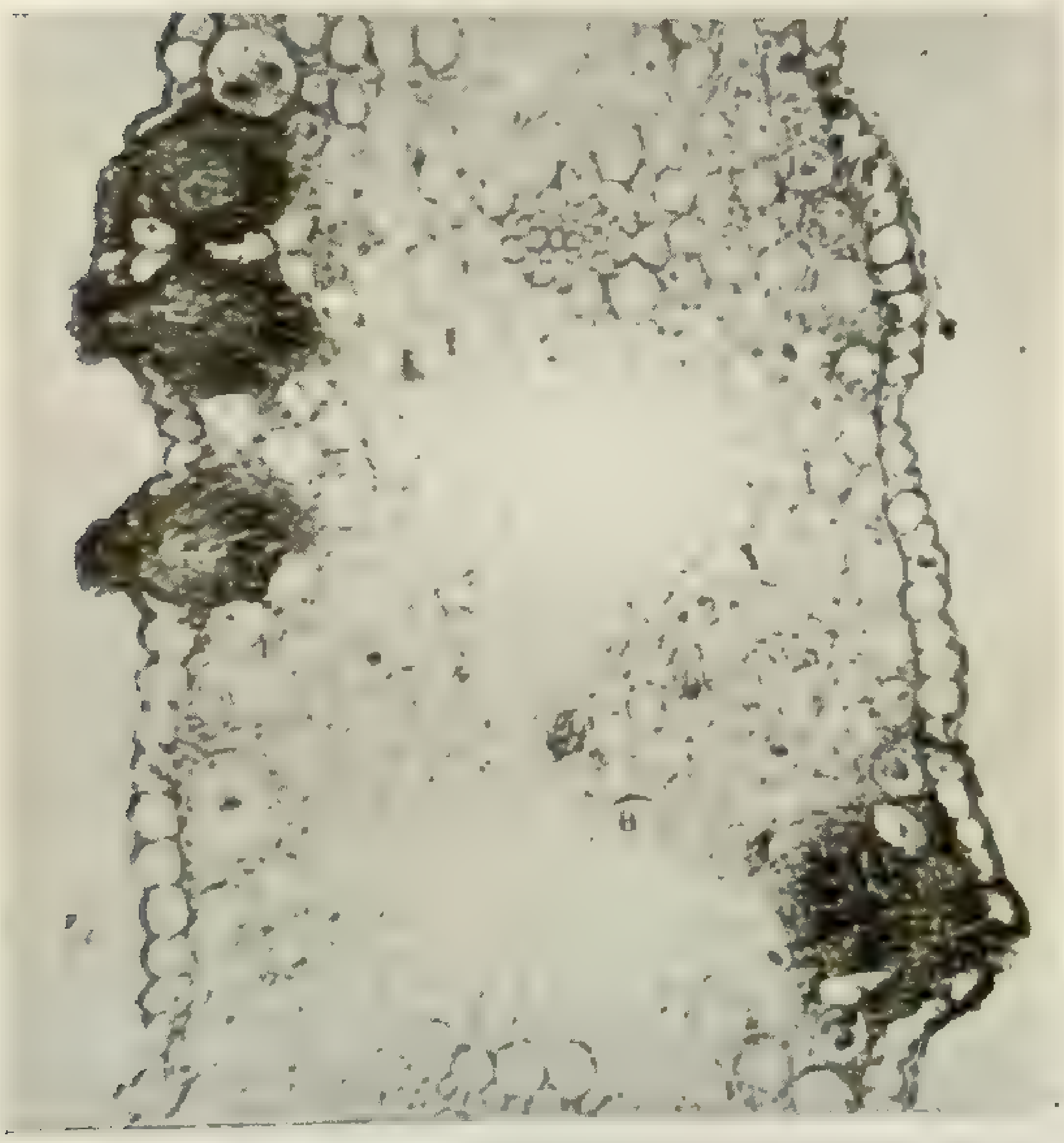

FIG. 2.

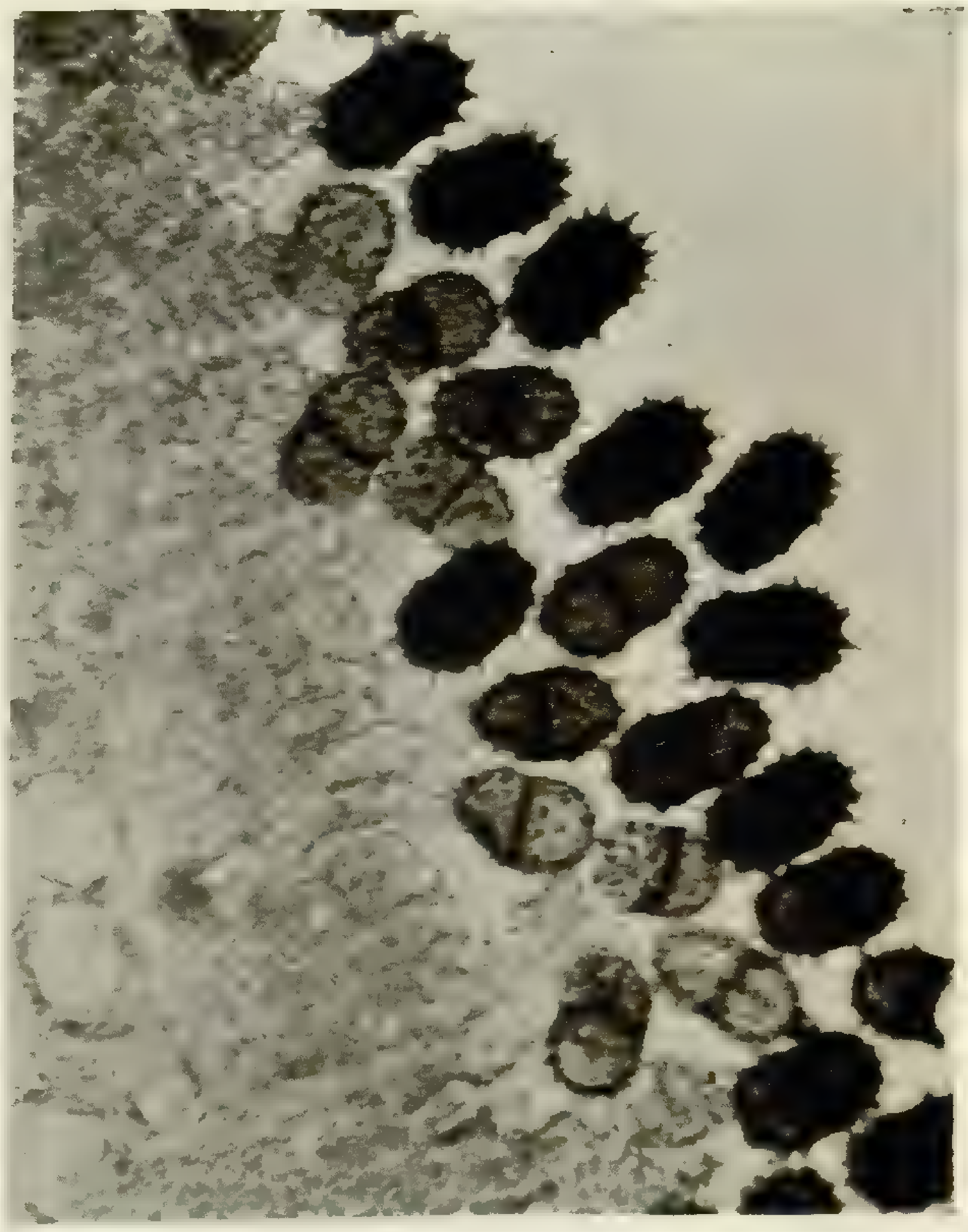

FIG. 4.

PUCCINIA PROSTII, MOUG.

Aeschynanthus chorisepala, Orr.

A new Chinese species; with an account of fissuring of its leaves.

BY

MATTHEW YOUNG ORR,
Assistant in Laboratory, Royal Botanic Garden, Edinburgh.

With Plate CXLIV.

Aeschynanthus (Diplotrichium) chorisepala, Orr. Sp. nov.

Species affinis *A. ramosissimae*, Wall. sed calyce usque ad imum in segmenta linearia fisso inter alia differt.

Frutex epiphyticus 30–75 cm. altus. Rami subteretes paulo compressi, decumbentes, nodis radicantes. Folia 10–12 cm. longa, 3–4 cm. lata, late lanceolata vel ovato-lanceolata vel oblonga, apice acuminata, basi late cuneata, petiolo 1–1.5 cm. longo praedita, coriacea, glabra, margine paululo recurva, nervis lateralibus obscuris. Pedunculi axillares 1–4-flori multo abbreviati; bracteae circ. 5 mm. longae, ovatae vel oblongae, tenuiter membranaceae, deciduae; pedicelli 1–2 cm. longi, glabri. Calyx tenuiter membranaceus usque ad basin divisus in segmenta 7 mm. longa, sublinearia vel lineari-oblonga, apice obtusa sparse ciliata. Corolla curvata, 3 cm. longa, laete kermesina; lobi subaequales, rotundati, circ. 5 mm. longi et lati, in medio atro-purpureo-maculati, pilis septatis glandulo-capitatis ut tubus conspersi. Filamenta exserta, superne glanduloso-pilosa; antherae 2 mm. longae. Ovarium glabrum; stylus sparsim glanduloso-pilosus. Capsula circ. 25 cm. longa, 3 mm. lata; semina oblonga, rugoso-scabra, prope hilum ditricha, apice monotricha.

"Epiphytic shrubby plant of 1–2½ ft. Flowers fleshy, crimson marked a deeper shade. On rocks and trees, in hills around Teng-yueh, Yunnan, West China. Lat. 25° N. Alt. 6000 ft. August 1913." G. Forrest. No. 11,742. *Type.*

"Prostrate plant of 1–2½ ft. Flowers bright crimson with a purple tip. On rocks in lava bed west of Teng-yueh. Lat. 25° N. Alt. 5000 ft. July 1912." G. Forrest. No. 9138.

Closely allied to *A. ramosissima*, Wall., but with a very distinct calyx of which the segments are almost entirely free

[Notes, R.B.G., Edin., No. XXXVIII, Sept. 1914.]

and are only slightly coherent at the base. They are linear or linear oblong in shape with obtuse apices bearing a few glandular hairs.

Many of the leaves of this new species of *Aeschynanthus* from Yunnan present an unusual appearance. They are tough and leathery in consistency, and are characterised by the presence of numerous elongated slits in the lamina, which, in the specimens examined, are often so regular in their arrangement as to suggest that their formation is not wholly fortuitous.

In many of the leaves, the slits—to the number of six or eight—are present on each side of the midrib, following roughly the direction taken by the lateral veins, but, in some cases, crossing them. In other leaves the slits are more elongated, and run from base to apex of the leaf, parallel to the midrib, and often contiguous to it. The perforation is not always complete, and the upper epidermal layer then appears as a transparent skin over the groove.

With a view to determining the mode of origin, and purpose, if any, of these slits, the structure of the leaf was examined in detail. In the arrangement of its tissues this leaf conforms closely to the leaves of other Gesneraceous species. The upper epidermis is many-layered, and specially adapted for water-storage. The outermost layer is strongly cuticularised, and this layer is further protected by a centrally placed " floor " of cells which have the walls adjacent to the water-containing cells thickened in a manner similar to those of the outermost epidermal layer. Pits are present in this thickened layer, and, by their agency, a supply of water reaches the underlying tissues. These consist of a narrow band of chlorophyll-containing cells, rich in clustered crystals of calcium oxalate, and several layers of spongy parenchyma, containing little or no chlorophyll, and possessing curious tube-like protuberances on their walls. The under epidermis is also strongly cuticularised, with stomata and numerous stalked glands, the latter situated in shallow circular depressions. The cell-walls under these glands are thinner, and, together with the stomatal openings, constitute points of weakness where the slits might originate.

Neither the configuration of the epidermis, nor the construction of the underlying tissues, suggest that the formation of the slits is other than accidental, and they probably owe their origin to an excessive loss of water from the tissues of the leaf. Such " Cracks due to drying " are mentioned by Solereder.*

Drying of the leaf brings about the rupture of the lower epidermis, probably at some point of weakness, and the exposure of the internal tissues, and their partial disorganisation follows, but the structure of the epidermal layer enables the plant to minimise the effects of such an accident. The epidermal cells have their outer and lateral walls thickened, while the inner walls remain unthickened, and the whole layer thus closely resembles the annulus of a fern sporangium, but in an inverse manner. When these cells lose their water, the broken ends of the layer curve naturally inwards, and enclose, and protect the exposed underlying tissue. As disorganisation proceeds, from below-upwards, ultimately only the outer layer of the upper epidermis remains, stretched across the fissure. With the gradual increase in tension this layer also ruptures, and, as it is similar in structure to the lower epidermis, its behaviour, as it loses moisture, is identical. The ruptured parts curve inwards, and become closely applied to the outer side of the inrolled lower epidermis. In this way the wound is sealed by a double layer of thick-walled cells, and the internal tissues are protected from further injury.

---

* Solereder, Syst. Anat. of Dicotyledons, Engl. Ed. (Oxford Press), ii, 1088.

EXPLANATION OF THE FIGURES IN PLATE CXLIV.

Illustrating Mr. M. Y. Orr's paper on Aeschynanthus chorisepala, Orr.

At *a*, a leaf without perforations.
At *b*, a leaf showing slits parallel with the primary veins.
At *c*, a leaf showing slits parallel with midrib.

The plate is taken from a photograph by Mr. R. M. Adam of a dried specimen in the Herbarium of the Royal Botanic Garden, Edinburgh.

YUNNAN, WEST CHINA
Coll. GEORGE FORREST No 1174

Alt. [illegible]
Locality [illegible]

Aeschynanthus chorisepala, Orr.
— Type!

Epiphytic [illegible]
[illegible] crimson
[illegible] a dense shade. on
rock [illegible]

AESCHYNANTHUS CHORISEPALA, ORR.

Ustilago Vaillantii, Tul., on Chionodoxa Luciliae, Boiss.

BY

R. C. DAVIE, M.A., B.Sc.,
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AND

MALCOLM WILSON, D.Sc., F.L.S.,
Lecturer on Mycology, University of Edinburgh.

With one figure in the text.

DURING March 1913, *Ustilago Vaillantii*, Tul.,* was found by one of us on flowers of *Chionodoxa Luciliae*, Boiss., growing in the Botanic Garden.

Up to the present this smut has been recorded on *Gagea fascicularis*, Salisb., *Scilla bifolia*, Linn., *Urginea anthericoides*, Steinh., *U. Scilla*, Steinh., *Muscari comosum*, Mill., *M. botryoides*, Mill., *Hyacinthus romanus*, Linn., *H. trifoliatus*, Tenore,† and *H. ciliatus*, Cyrill.‡

In Great Britain § it commonly occurs in the anthers and ovaries of *Scilla bifolia*, and it is present on this plant in the Botanic Garden. It was recorded on *Chionodoxa* at Kew in 1893.‖ In the case of *Chionodoxa* we have discovered it only in the anthers. According to W. G. Smith,§ infected plants of *Scilla* remain vigorous for a year or two, but succumb to repeated attacks. He adds that plants of *Chionodoxa* fall an easy prey to the fungus. Since no previous record on *Chionodoxa* has been made in Scotland and as the disease appears to do considerable harm, a further investigation of the fungus was undertaken. In colour and in structure the spores agree with the description of those of *Ustilago Vaillantii*, given by Saccardo ;† in size they fall within the limits of measurement quoted by him. On *Chionodoxa* the spores measured 10–13 μ × 8–10 μ. When fresh

---

* L. and Ch. Tulasne, Ann. des Sci. Nat., sér. 3, vii (1847), p. 90.

† P. A. Saccardo, Sylloge Fungorum, vii (1888), p. 465.

‡ H. and P. Sydow, Ann. Mycol., vi (1908), p. 528.

§ Worth. G. Smith, Gard. Chron. xv (1894), p. 463.

‖ G. Massee, Grevillea, xxi (1892–93), p. 120.

[Notes, R.B.G., Edin., No. XXXVIII, Sept. 1914.]

the spores readily germinate in water (text-fig. 1), and produce a three-celled promycelium.* After drying for about a fortnight, they no longer germinated in water, but in plum decoction quickly gave rise to the promycelium. In both cases sporidia were shortly afterwards formed.

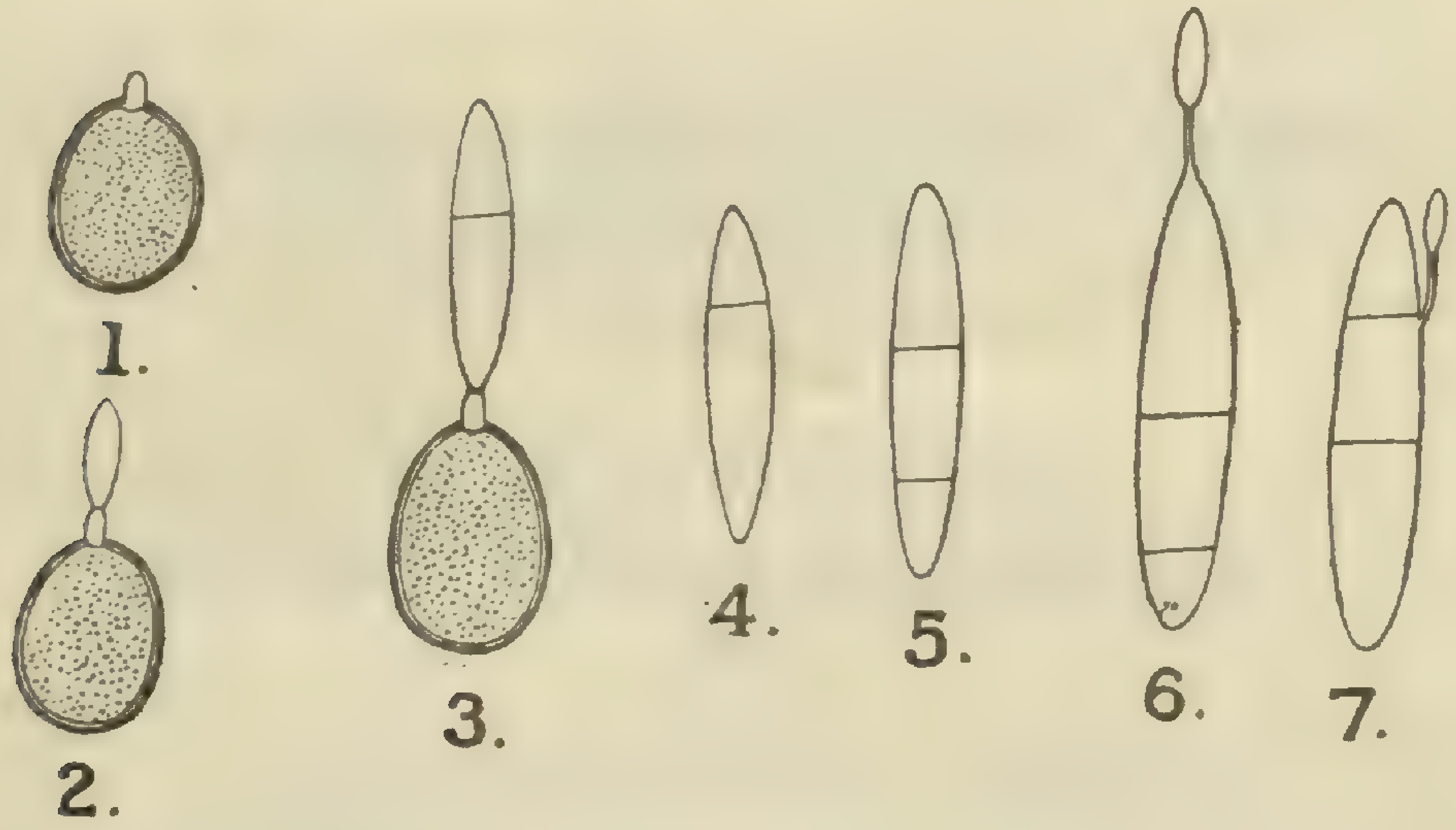

FIG. 1.—Ustilago Vaillantii, Tul.

1. Germinating spore.
2. Formation of promycelium.
3. First division in promycelium.
4. Promycelium detached from spore ; one division.
5. ,, ,, two divisions.
6. } Formation of sporidia.
7. }

At present no information is available regarding the method of infection ; whether spores from the anthers of *Scilla bifolia* can bring about infection of *Chionodoxa* is not known.

---

* Cf. O. Brefeld, Unters. aus dem Gesammtgeb. der Mykologie, Heft xii (1895), p. 111, Taf. vi, figs. 32–38.

Vol. VIII. [FOR OFFICIAL USE.] Number XXXIX.

NOTES

FROM THE

ROYAL BOTANIC GARDEN, EDINBURGH.

JANUARY 1915.

CONTENTS.

Page

Some New Plants from Japanese Mountains. (With Plate CXLV.) By H. Takeda, D.I.C. 229

An Enumeration of the Chinese Astragali: with Descriptions of New Species. By N. Douglas Simpson, B.A., F.R.M.S. 239

Contributions to the Knowledge of the Asiatic Polypodiums, with special reference to the Chinese Species. With an Appendix of the Chinese and Japanese Species in the Herbarium of the Royal Botanic Garden, Edinburgh. By H. Takeda, D.I.C. 265

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Some New Plants from Japanese Mountains.

BY

H. TAKEDA, D.I.C.,
Lately Demonstrator in Botany, Imperial College of Science and Technology, London.

With Plate CXLV.

THE new plants described here—of which specimens are deposited in the Herbarium of the Royal Botanic Garden, Edinburgh—were mostly collected on the mountain-group of Yûparo-dake, in the Island of Yezo. These mountains, which are of palaeozoic formation and of considerable height, reaching some 6000 ft. from sea-level, had hardly been explored from the botanical point of view until Mr. H. Yanagisawa made ascents in 1912 and again in the following year.* His collection is excellent, and contains a number of plants of great interest. Amongst others, I may perhaps mention the occurrence of the following plants which have either not been known from Yezo, or are really worth recording :—

Alsine arctica, Fenzl.
A. verna, Bartl., var. *borealis*, Fenzl.
Anemone narcissiflora, Linn., var. *villosissima*, DC.
A. Taraoi, Takeda, var. *nipponica*, Takeda, in Journ. Bot., 1910, p. 226.
Angelica multisecta, Maxim.
Arcterica nana, Makino, in Tôkyô Bot. Mag., 1906, p. 85.
Arenaria Katoana, Makino, ibid., 1905, p. 88.
Arnica unalaschkensis, Less.
Artemisia norvegica, Fries.
Bryanthus Gmelini, D. Don.
Bupleurum longifolium, Linn., var. *aureum*, Wolf, subvar. *brevi-involucratum*, Wolf ; cf. Takeda, in Tôkyô Bot. Mag., 1910, p. 177 ; and Journ. Linn. Soc. xlii (1914), p. 467.
B. triradiatum, Adams.

---

* Mr. T. Ishikawa made an ascent in 1896 and did some plant-collecting, although that was not his object.

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Calamagrostis urelytra, Hack., var. *parvigluma*, Takeda, Tôkyô Bot. Mag., 1910, p. 37.
Carex flavocuspis, Fr. et Sav.
C. hakkodensis, Franch.
Draba japonica, Maxim.
Dryas octopetala, Linn.
Gentiana Kawakamii, Makino.
G. nipponica, Maxim.
Hedysarum obscurum, Linn., var. *neglectum*, Trautv.
Hierochloë alpina, Roem. et Schult.
Lactuca dentata, Makino, var. *alpicola*, Makino, ibid., 1913, p. 29.
Lagotis glauca, Gaertn.
Macropodium pterospermum, Fr. Schm.
Mertensia rivularis, DC., var. *japonica*, Takeda.
Microstylis monophyllos, Lindl.
Patrinia sibirica, Juss.
Peucedanum multivittatum, Maxim. ; cf. Takeda, ibid., 1910, p. 177.
Phyllodoce nipponica, Makino, ibid., 1905, p. 131.
Platanthera Makinoi, Yabe ; cf. Takeda, l.c., p. 136.
P. Takedai, Makino, ibid., 1903, p. 120.
Polygonum polymorphum, Ledeb., var. *ajanense*, Rgl. et Til. forma *glabrescens*, Takeda, l.c., p. 176.
Polypodium lineare, Thumb., var. *ussuriense*, C. Chr. (=*P. coraiense*, Christ).
Primula yuparensis, Takeda, in Notes Roy. Bot. Gard., Edin., xxxvii (1913), p. 94, tab. xxv.
Sanguisorba canadensis, Linn., var. *media*, Maxim.
Stellaria florida, Fisch., var. *angustifolia*, Maxim. ; cf. Takeda, in Tôkyô Bot. Mag., 1910, p. 12.
Swertia perennis, Linn.
Thlaspi japonicum, Boiss.
Tofieldia Okuboi, Makino ; cf. Takeda, in Tôkyô Bot. Mag., 1910, p. 317.
Trisetum subspicatum, Beauv.
Veronica Schmidtiana, Rgl. α *typica*, Makino ; cf. Takeda, in Journ. Linn. Soc. xlii (1914), p. 481.
V. serpyllifolia, Linn.
Viola crassa, Makino.
Woodsia ilvensis, R. Br.

Mt. Arakawadake, on which my new *Astragalus* was found, is of palaeozoic rock, and is nearly 10,000 ft. in altitude.* This is one of the most interesting mountains in Central Japan, but as yet has been explored very little indeed. In its alpine and subalpine regions one sees, among others, the following interesting plants :—

---

* According to the latest survey, 9994 feet.

Alsine arctica, Fenzl.
Arctous alpina, Nied.
Campanula pilosa, Pall., var. *dasyantha*, Herd.
Cryptogramma Stelleri, Prantl.
Draba Sakuraii, Makino, var.
Lloydia alpina, Salisb.
Macropodium pterospermum, Fr. Schm.
Oxyria digyna, Hill.
Pedicularis verticillata, Linn.
Polystichum lachenense, Bedd.; cf. Makino, ibid., 1904, p. 16.
Potentilla Matsumurae, Th. Wolf.
Rubus pseudo-japonicus, Koidz.
? *Salix Nakamurana*, Koidz., in Tôkyô Bot. Mag., 1913, p. 96; et in Matsum. Icon. Koishikaw., vol. i, sub tab. 75, Sept. 1913.
Saussurea kai-montana, Takeda, forma *minor*, Takeda.
Saxifraga bronchialis, Linn.
S. bronchialis, Linn., var. *cherlerioides*, Engl.
Sibbaldia procumbens, Linn.
Veronica Stelleri, Pall.

The flora of Mt. Maëdake, on which I found the form of *Silene Keiskei* with pure white flower, is very little known. This gigantic mountain, of a little less than 10,000 ft. in height,* and also of palaeozoic rocks, is situated not very far from the one above mentioned. Its summit is densely covered with the straggling *Pinus pumila*, as in most cases in the high mountains of Central and Northern Japan. In the alpine region one comes across such plants as follows :—

Adenophora Lamarckii, Fisch.
Alsine arctica, Fenzl.
Arcterica nana, Makino.
Arctous alpina, Nied.
Campanula pilosa, Pall., var. *dasyantha*, Herd.
Cnidium Tachiroei, Makino.
Cornus canadensis, Linn.
Diapensia lapponica, Linn., var. *obovata*, Fr. Schm.
Draba Sakuraii, Makino, var.
Empetrum nigrum, Linn.
Euphrasia Matsumurae, Nakai.
Gentiana algida, Pall., var. *sibirica*, Kusnez.
Hedysarum esculentum, Ledeb.
Loiseleuria procumbens, Desv.

---

* 9940 feet.

Oxytropis japonica, Maxim.
Phyllodoce aleutica, Makino, ibid., 1905, p. 134.
P. nipponica, Makino.
Potentilla Matsumurae, Th. Wolf.
Saussurea kai-montana, Takeda, forma *minor*, Takeda.
Saxifraga bronchialis, Linn., var. *cherlerioides*, Engl.
Tofieldia Okuboi, Makino.

It may be of some interest to mention here, *à propos*, that in Japan the same species of plants are very frequently found on mountains of different rocks quite irrespective of chemical nature of soil. Their distribution seems to me largely to depend on the physical conditions of the locality. For example, *Dryas octopetala* grows on mountains of palaeozoic rock, of granite, or of andesite.

I may also mention here that most of the plants found on the high mountains of Hontô, or the main island of Japan, are of arctic character, and they are distributed over Yezo and the Kuriles, and some are also in Sakhalien. But, on the whole, the alpine flora of Central and Northern Japan has more intimate relationship to that of the Kuriles than that of Sakhalien. This fact probably indicates that La Pérouse Strait was formed earlier than Tsugaru Strait. It was first put forward by Blakiston * that Tsugaru Strait forms a decided line of demarcation of the faunas of Hontô and Yezo. It appears to me, however, that, botanically speaking, La Pérouse Strait is the primary, and Tsugaru Strait the secondary line of demarcation. †

Aconitum yuparense, Takeda (figs. 1–4).

Tuber napiforme, fuscum. *Caulis* elatus, bipedalis, rectus, superne flexuosus et pilis albis crispulis hirsutus. *Folia* inferiora longe-petiolata, superiora brevi-petiolata, petiolo ciliato, omnia 5-palmati-partita, basi cordata, margine ciliata, lobis late ovalibus ternato-trifidis, laciniis plus minus divergentibus, lanceolatis linearilanceolatisve, media et superiora aperte cordata, suprema minus laciniata, utrinque ad nervos pilis albis pubescentia. *Inflorescentia* racemosa, racemis terminalibus et axillaribus. *Racemus* abbreviatus, densus, subcorymbiformis, 4–5-florus, rectiusculus. *Pedunculi* erecti, 1.5–2.5 cm. longi, pube alba hirti; bracteae superiores palmati-partitae, majusculae pedunculo longiores; bracteolae infra medium suboppositae, lanceolatae. *Flores* magni, 4.5 cm. longi, teneri, extus tenuiter pubescentes, intense violacei; *galea* ampliato-fornicata, 3 cm. longa, dorso subaequaliter parabolica, antice breviter rostrata;

---

* Blakiston, Zoological Indications of Ancient Connection of the Japan Islands with the Continent, in Trans. As. Soc. Japan, xi (1883), pp. 126–140.

† Cf. Takeda, The Flora of the Island of Shikotan, in Journ. Linn. Soc., xlii (1914): in particular, pp. 445–446.

sepala media ampla, 2 cm. longa lataque, intus longe pilosula; *sepala inferiora* elliptica, obtusa vel acutata, circa 2 cm. longa, 1 cm. lata; *nectaria* cum ungui gracili, apice curvato, glabro, fere 3 cm. longa, cuculo permagno, elongato, supino, calcare arcuato, apice rotundato, labio dilatato, emarginato. *Staminum* filamenta lanceolata, supra medium bidentata, exinde subfiliformia, pilosa, antheris rotundatis fuscis. *Carpella* 4, pubescentia, stylo ovario paulo breviore, rectiusculo.

Quoad staturam *A. kamtschatico*, Pall. simile, a quo bracteis palmati-partitis, basi aperte cordatis, bracteolis infra medium pedicelli nascentibus nec subapicalibus, floris colore, galea fornicata et antice producta nec sphaerico-conica, sepalis inferioribus multo latioribus distinguitur.

HAB.—Alpine region, Yuparo Mountains, Yezo (H. Yanagisawa).

Astragalus (Phaca, Hemiphragmium) **arakawensis,** Takeda (figs. 16–20).

Multicaulis, *caule* 15–20 cm. alto, flexuoso, ramosissimo, pubescenti pilis albis cum nigris mixtis. *Folia* densa, internodiis longiora, 5–7 cm. longa, foliolis 5–7-jugis, brevi-petiolulatis oblongo-ellipticis, 10 mm. longis, 3–4 mm. latis, retusis vel emarginatis, supra glabris, subtus pallidioribus, plus minus albo-pubescentibus, stipulata, stipulis lanceolato-subulatis, ciliolatis, 3 mm. longis. *Pedunculi* erecti vel adscendentes, folium valde superantes, pubescentes, 10–12 cm. longi. *Racemi* elongati, circa 10-flori, bracteis minutis, hyalinis, apice acutis semi-barbatis. *Flores* parvi, 12 mm. longi, leucophaei, carina apice violaceo-picta, brevi-pedicellati. *Calyx* campanulatus, 5 mm. longus, pubescens, pilis albis et nigris mixtis, lobis brevibus acutis. *Vexillum* obovatum, emarginatum, circa 10 mm. longum, 4 mm. latum. *Alae* vexillo aequilongae, oblongae, apice semi-mucronatae, obtusae, basi auriculatae, unguiculatae, ungue lamina breviore. *Carina* alis multo brevior, 7 mm. longa, basi auriculato-sagittata. *Stamina* carinae aequilonga, basi connata, filamentis inaequilongis, antheris ellipticis flavis. *Ovarium* breviter stipitatum, stipite 1 mm. longo, adpresse pubescens, stylo curvato, ovario aequilongo, stigmate aurantiaco. *Legumen* breviter pedicellatum, oblongo-ellipticum, membranaceum, parce pubescens, 12 mm. longum, dorso profunde sulcatum, sub-biloculare, 4–6-spermum.

Arcte affinis *A. shiroumaensi*, Makino, sed ab eo differt planta robustiore, caule flexuoso, dense ramoso, stipulis angustioribus, acutis nec obtusis, foliolis subtus pallidioribus, pedunculis longioribus, racemis elongatis, stigmate aurantiaco nec albo, legumine biloculare.

HAB.—Mt. Arakawadake and along the upper valley of the Arakawa where the seed has been carried down by water, Prov. Shinano (H. Takeda. August 1913).

Gentiana (Amarella) **yuparensis,** Takeda.

Caulis 8–17 cm. altus, simplex vel pauciramosus, 4-lineatus, glaber. *Folia* infima spathulata, media oblonga, superiora oblongo-ovata, vel ovata, omnia obtusa, glabra. *Flores* pauci, pro planta magni. *Calyx* leviter hirtellus, corollae tubum superans, tubo brevi, 5 mm. longo vel breviore, lobis valde inaequalibus, acutis, tubum valde superantibus. *Corolla* 3 cm. longa, quinque-fida, intus corona fimbriata, tubo cylindrico, limbo duplo longiore, albido, minute denseque violaceo-punctato, limbo intense violaceo, lobis ovalibus, acutis. *Ovarium* stipitatum, stipite calycis tubum aequanti.

Affinis *G. noricae*, A. et J. Kerner (Fl. Exsicc. Austr.-Hung., no. 2190), calyce corollae tubum superanti, corolla cylindrica nec campanulata, tubo limbo duplo longiore dignoscitur. A *G. Amarella*, Linn. floribus majoribus, calyce corollae tubum valde superanti, lobis inaequalibus, ovario stipitato facile distinguitur.

HAB.—Alpine region of Yuparo Mountains, Yezo (H. Yanagisawa. 8th August 1913).

Krascheninnikowia heterantha, Maxim.,* var. **linearifolia,** Takeda.

Differt a typo praecipue foliis valde angustioribus linearibus. *Planta* sub anthesi humilis, 6–10 cm. alta. *Folia* omnia linearia, media et superiora 3–4.5 cm. longa, ad 3 mm. lata. *Pedunculi* folio breviores.

HAB.—In shady woods, Mt. Tsukuba, Prov. Hitachi (H. Takeda. 1st May 1904).

Saussurea chionophylla, Takeda (figs. 5–7).

Planta depressa. *Caulis* 7–8 cm. altus, solitarius, simplex, plus minus angulatus, parce arachnoideo-tomentosus, dense foliatus. *Folia* majuscula, in sicco subcoriacea, ovata, cordata, acuta, circumcirca subduplice serrato-dentata, adulta supra glabrata subtus dense niveo-tomentosa, 5–7 cm. longa, 4–5 cm. lata, inferiora longe (ita ut lamina ipsa) superiora breviter petiolata, suprema multo minora, subsessilia. *Inflorescentia* terminalis, oligocephala. *Anthodia* circiter 5, subsessilia, ovoidea, 10 mm. longa, fere 8 mm. diametro ; *squamis involucri* quadriseriatis, imbricatis, majusculis, omnibus adpressis, nigro-fuscis, extimis ovatis, apicem versus subciliatis, mediis ellipticis, acutis, intimis longioribus, oblongo-lanceolatis, albo-ciliatis, dorso

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* For a revision of this genus, see Kew Bull. (1913), no. 2.

glabris; receptaculo nudo. *Corolla* 11 mm. longa, tubo limbum aequanti, limbo ad quatuor partes 5-fido, segmentis linearibus, obtusis; pappi serie externa perpauca, circ. 2 mm. longa, serie interna ad 10 mm. longa, corolla breviore. *Achenium* (immaturum) ad 5 mm. longum, fusco-nigrum, leve.

Affinis *S. discolori*, DC., a qua caule valde depresso, foliis crassioribus latioribusque, squamis involucri majoribus, receptaculo non paleato distinguenda.

HAB.—Alpine region of Yuparo Mountains, Yezo (H. Yanagisawa. 8th August 1913).

Saussurea Yanagisawae, Takeda (figs. 5–7).

Planta omnino plus minus arachnoideo-pubescens, pygmaea. *Caulis* subcrassus, 10 cm. circiter altus, simplex, paucifoliatus. *Folia* in sicco crassiuscula, supra praesertim marginem versus pilis multicellularibus glandulosis parce vestita, ovalia vel anguste ovalia, apicem versus acuminato-attenuata, basi cuneata, in petiolum alatum plus minus decurrentia, margine paucidentata, dentibus callosis, plus minus (et plerumque retrorsum) curvatis, basilaria longe (ita ut lamina ipsa) cetera breviter petiolata, 3–4 cm. longa, 1.5–2 cm. lata. *Inflorescentia* terminalis, dense corymbosa, multicephala. *Anthodia* fere 10, brevi-pedunculata, cylindrico-campanulata, 7–8 mm. diametro; squamis involucri subquinque-seriatis, imbricatis, majusculis, inaequilongis, omnibus adpressis, fusco-nigricantibus, dorso pilosulis, apice villosulis, margine ciliatis, extimis oblongo-ovatis, acutatis, mediis ovatis, cuspidatis, intimis late lanceolatis, paulo longioribus; paleis receptaculi $\frac{3}{4}$ involucri aequantibus, anguste subulatis. *Corolla* 12 mm. longa, tubo limbo aequilongo, limbo ad duas partes 5-fido, segmentis linearibus, obtusiusculis; pappi serie externa subnumerosa, $\frac{1}{5}$–$\frac{1}{3}$ internae aequilonga, serie interna 10 mm. longa, corolla breviore. *Achenium* (immaturum) 4–5 mm. longum, nigro-fuscum, leve.

S. alpina, DC. affinis, sed ab ea foliorum forma, anthodio minore, floribus minoribus differt.

HAB.—Mt. Ashpetnupuri, Yezo (H. Yanagisawa. 5th August 1913).

Saxifraga (Boraphila) **laciniata,** Nakai et Takeda (figs. 21–22).

Rhizoma crassum, obliquum, *scapo* erecto, nudo, pilis glanduliferis parce obsito. *Folia* uti videtur e sicco carnosula, pilis glandulosis parce vestita, ciliata, oblongo-cuneata, basin versus sensim attenuata, 1–2 cm. longa, 4–8 mm. lata, apice plus minus rotundata, aequaliter inciso-dentata, dentibus acutis. *Inflorescentia* corymboso-paniculata, 3–12-flora; bracteae oblongo-lanceolatae, integrae, infima oblongo-cuneata,

tridentata, ciliolata. *Pedicelli* filiformes, floribus duplo triplove longiores, puberulenti. *Calycis laciniae* ovatae, obtusae integrae, glabrae, plus minus coloratae, 2–3 mm. longae, semper reflexae. *Petala* oblongo-ovata, luteo bi-maculata, longe unguiculata, cum ungui 5 mm. longa. *Stamina* filamento petalis duplo breviore, filiformi, apicem versus attenuato nec clavato, antheris purpureis, in specimine fructifero erecto. *Ovarium* ovatum, stylo brevissimo coronatum. *Capsula* colorata, ad medium usque dehiscens.

S. *unalaschkensi*, Sternb.* arcte affinis, sed ab ea praecipue foliis oblongo-cuneatis nec obovato-cuneatis, bracteis pedicello multo brevioribus, filamentis subulatis nec clavatis, antheris purpureis nec flavis, stylo brevissimo nec longo differt.

HAB.—Alpine region of Mt. Nutap-kam-ushpe, Yezo (H. Koidzumi. July 1913), and of Yuparo Mountains, Yezo (H. Yanagisawa. 8th August 1913).

It is very interesting to know that this species occurs also on Chang-pai Mountains, on the boundary between Corea and Manchuria. The first specimens were collected by James and recorded by him as S. *stellaris*.† The same specimens have been identified later by Komarov as S. *stellaris* var. *comosa*,‡ perhaps on account of their small size. Neither identification is, however, correct, since the specimens exactly represent our new species. Some more specimens of the same plant have been collected by Mr. T. Mori, teacher at Seoul, in August 1913, on the same mountains.§

Silene Keiskei, Miq. forma **minor,** Takeda || lusus, **leucantha,** Takeda.

Differt ab aliis flore albissimo. Flores saepe diametro 3 cm. et paulo ultra.

HAB.—Subalpine region, Mt. Maëdake, Prov. Shinano (H. Takeda. August 1913).

var. **procumbens,** Takeda.

Differt a typo caulibus elongatis, usque ad 10 dm. longis, procumbentibus, saepe apice ad nodos radicantibus. Flores mediocres rosei.

HAB.—Mt. Myôgisan, Prov. Kôtsuke (T. Yamanaka).

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* Engler (Monogr., p. 148) has reduced S. *unalaschkensis* to S. *davurica* as a variety. These two are, however, to be retained as distinct species. In S. *unalaschkensis* the calyx is reflexed, whereas in the other it is erect or erect-patent; the leaf is glabrous and only ciliate in the former, and it is densely covered with multicellular hairs in the latter. The flower is slightly larger in the former than in the latter.

† James, The Long White Mountains, p. 456 (1880).

‡ Kom., Fl. Manch., ii, p. 414 (1904).

§ Cf. Nakai, in Tôkyô Bot. Mag., 1914, p. 305.

|| Takeda, ibid., 1910, p. 63.

Trisetum leve, Takeda.

Culmus circa 30 cm. altus, tenuis, binodalis, levis. *Vaginae* internodiis paulo breviores, leves. *Ligula* 5 mm. longa, anguste ovata, acuta, integra levis. *Laminae* lineares vaginis suis aequilongae, 3 mm. latae, glabriusculae, acutae. *Panicula* lanceolata, plus minus nutans, effusa, 15 cm. longa, rhachi ramisque levibus, ramis 2-nis, ad medium ramulosis, ramulis subnumerosis, scaberulis, 2–5-spiculatis. *Spiculae* lanceolatae, 7–8 mm. longae, pallide purpurascentes, 3-florae, flore terminali minore perfecto. *Glumae steriles* lanceolatae, leves vix carina superne scaberulae, I^{ma} uninervia, 4 mm. longa, II^{da} subtrinervia, nervis lateralibus obscuris, 5 mm. longa. *Gluma fertilis* 4 mm. longa, anguste elliptica, tenui-membranacea, levis, inferne 3- superne 2-nervia, apice irregulariter erosula, arista infra medium exserta, tenui, stricta nec torta nec geniculata, scaberula, 3–5 mm. longa, callo pilis glumae dimidium fere aequantibus parce obsito. *Palea* glumam aequans, linearilanceolata, binervia, apice bidentula. *Rhachillae* 2 mm. circiter longae, pilis longis densiuscule barbatae.

T. flavescenti, Beauv. quoad staturam plus minus simile, a quo arista tenui stricta satis distinguendum.

HAB. — Yuparo Mountains, Yezo (H. Yanagisawa. 9th August 1913).

EXPLANATION OF PLATE CXLV.

Illustrating Mr. Tadeka's paper on Some New Plants from Japanese Mountains.

FIGS. 1– 4.—*Aconitum yuparense*: 1, Hood, cut vertically, with nectary inside, ×1.5. 2, Middle, and 3, lower sepal, ×1.5. 4, Stamen, ×4.

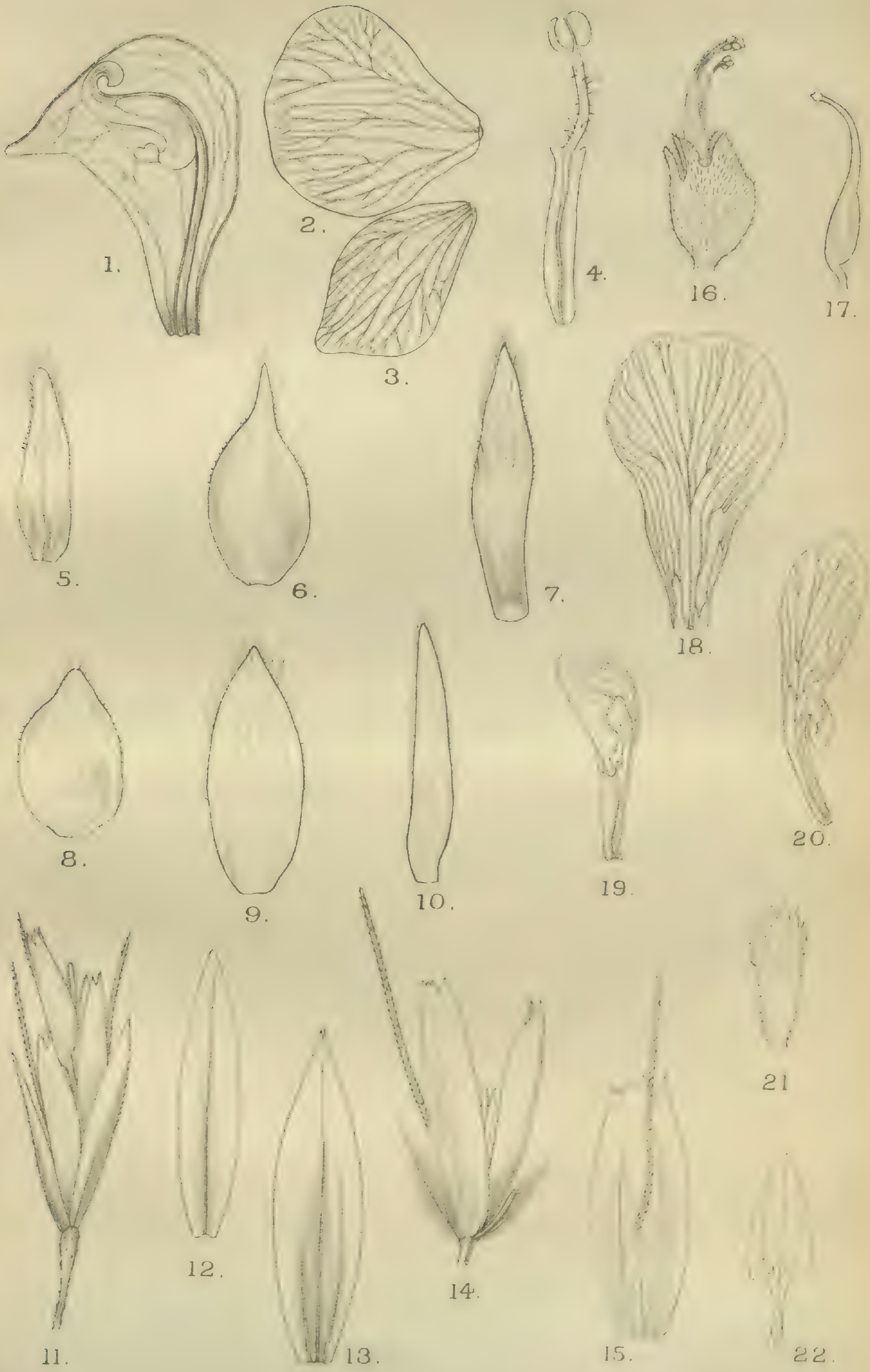
FIGS. 5– 7.—*Saussurea Yanagisawae*: 5, Outermost, 6, middle, and 7, innermost scale of involucre; all ×4.

FIGS. 8–10.—*Saussurea chionophylla*: 8, Outermost, 9, middle, and 10, innermost scale of involucre; all ×4.

FIGS. 11–15.—*Trisetum leve*: 11, Spikelet, ×6. 12, Lower, and 13, upper sterile glume, ×10. 14, Flower, ×10. 15, Fertile glume, ×10.

FIGS. 16–20.—*Astragalus arakawensis*: 16, Calyx and androecium. 17, Pistil. 18, Standard. 19, Keel. 20, Wing. All ×4.

FIGS. 21–22.—*Saxifraga laciniata*: 21, Leaf, natural size. 22, Petal, ×6.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J. Keith del.

An Enumeration of the Chinese Astragali.

With Descriptions of New Species.

BY

N. DOUGLAS SIMPSON, B.A., F.R.M.S.

A. SPECIES NOVAE.

Astragalus Arnoldianus, N. D. Simpson. Sp. nov., ab *A. frigido,* A. Gray, stipulis parvis angustis, caulibus inferne purpureis nigro-hirsutis, foliolis pilis strictis instructis distinguendus.

Herba perennis, erecta, pilis basifixis instructa ; caules circa 36 cm. alti, valde striati inferne purpurascentes, pilis nigris albisque mixtis vestiti, superne canaliculati, pallidi pilis nigris adpressis obtecti. *Folia* ad 10 cm. longa, petiolis 2.7 cm. longis inclusis, rhachide pilis nigris adpressis sparse instructa, 4–6-juga ; foliola opposita vel alterna, obovata, 22 mm. longa, 15 mm. lata, apice obtusa vel retusa, petiolulis dense nigro-hirsutis 1.5 mm. longis suffulta, utrinque pilis albis nigrisque strictis adpressis instructa ; stipulae infimae erectae, ovatae, acutae, 7 mm. longae, medianae ovato-oblongae, 7 mm. longae, 2.5 mm. latae, a petiolo liberae, superiores lanceolatae, 5 mm. longae, angustae, vix 1.5 mm. latae. *Racemi* laxi, ad 17-flori, pedicellis ad 8.5 cm. longis folia saepe fere aequantibus pilis nigris dense instructis ; bracteae lanceolatae, 4 mm. longae, ad 1.5 mm. latae ; bracteolae 2 lineares, minutae, vix 1.5 mm. longae ; pedicelli 3 mm. longi, densissime nigro-hirsuti. *Calyx* late tubuloso-campanulatus, ad 9 mm. longus, pallide viridis, basi nigrescens, pilis nigris minutis instructis, dentibus brevibus ad 1 mm. longis subaequalibus. *Corolla* calycis tubo duplo longior ; vexillum obovatum, 18 mm. longum, 8.5 mm. latum, apice acutiusculum, basi in unguem 2.5 mm. latum sensim productum ; alae 18 mm. longae, 2.5 mm. latae, lamina parva supra auriculam angustam gibba apice acuta ungui 10.5 mm. longo ; carina 15 mm. longa, 3 mm. lata, apice obtusa, auricula obtusa, ungui 10 mm. longo. *Stamina* diadelpha, filamentis inaequaliter connatis. *Ovarium* stipitatum, pauci-ovulatum, uniloculare, dense pilis albis nigrisque hirsutum ; stylus brevis, stigmate capitato.

[Notes, R.B.G., Edin., No. XXXIX, Jan. 1915.]

Szechuen: flowers pale yellow. Habitat, grasslands. West of Kuan Heien. Alt. 3000 m. August 1908. Wilson, 3797! Herb. Kew.

Astragalus camptodontoides, N. D. Simpson. Sp. nov., ab *A. camptodonto*, Franch., stipulis linearibus, foliolis anguste oblongis mucronatis subtus pilis albis dense vestitis, bracteolis tubum aequantibus, calycis dentibus anguste linearibus saepe subulatis tubum excedentibus distinguendus.

Herba gracilis, caulibus decumbentibus, pilis albis adpressis non furfurcaceis dense vestitis. *Folia* alternipinnata, 5–7-juga, ad 4 cm. longa, subsessilia; foliola anguste oblonga, utrinque attenuata, petiolulis 1 mm. longis, mucronata, majora 10 mm. longa, 2.5 mm. lata, supra glabra subtus, rhachide petiolulisque pilis albis brevibus dense vestitis; stipulae caulinares liberae, anguste lanceolatae, acuminatae, erectae vel reflexae, ad 5 mm. longae, subtus dense pilosae. *Racemi* laxi 4-flori, pedunculis 2 cm. longis pilis nigris albisque dense vestitis; bracteae lanceolatae, acuminatae, ad 6 mm. longae; bracteolae 2, ad 4.5 mm. longae; pedicelli ad 3 mm. longi, pilis nigris densissime instructi. *Calyx* campanulatus, circiter 3.5 mm. longus, pilis nigris adpressis sparse obtectus, dentibus anguste linearibus saepe fere subulatis ad 5.5 mm. longis. *Corolla* calycem multo excedens, violaceus (ex *Delavay*); vexillum suborbiculare, 15.5 mm. longum, 11 mm. latum, in unguem angustum 4 mm. longum abrupte contractum, emarginatum, glabrum, alas carinamque superans; alae 13 mm. longae, 3.5 mm. latae, lamina apice obtusa basi obtuse auriculata in unguem 4 mm. latum attenuata; carina 14.5 mm. longa, 4.5 mm. lata, ungui 4 mm. longo. *Stamina* diadelpha. *Ovarium* stipitatum, glabrum, multi-ovulatum; stigma barbatum.

Yunnan: Lon Kong, Delavay, 936! Herb. Kew.

Astragalus Craibianus, N. D. Simpson. Sp. nov., ab *A. coronilloide*, Ulbrich, caulibus humilioribus, racemis 4-floris subumbellatis, bracteis circa 5 mm. longis, calycis dentibus basi 1.5 mm. latis, corolla circa 15 mm. longa facile distinguendus.

Herba humilis, rhizomate crasso multi-ramoso, multicaulis, caulibus brevibus glabrescentibus. *Folia* ad 4 cm. longa, petiolis inclusis, imparipinnata, 5–10-juga; foliola suborbicularia vel elliptico-oblonga, majora 8 mm. longa, 4 mm. lata, obtusa vel subacuta, mucronulata, distincte petiolulata, nervis conspicuis, supra glabra, subtus pilis patulis albis fuscisque laxe obtecta; stipulae liberae vel leviter connatae, magnae, lanceolatae, inferiores late ovatae, acutiusculae, ad 6.5 mm. longae et 2.5 mm. latae, utrinque glabrae, margine pilosae, intus basi minute glandulosae. *Racemi* subumbellati, 4-flori, pedunculis ad 4.5 cm. longis folia subaequantibus parce pilosis ; bracteae lineares, acutae, ad 5 mm. longae et 1.5 mm. latae, pilis paucis instructae ; bracteolae nullae ; pedicelli 3 mm. longi, densissime nigro-pilosi. *Calyx* campanulatus, ad 4 mm. longus et 3 mm. latus, pilis fuscis albisque instructus dentibus triangularibus ad 3 mm. longis et 1.5 mm. latis pilis patulis dense vestitis. *Corolla* calycem multo superans ; vexillum suborbiculare, margine integro, 16 mm. longum, ungui 6 mm. longo incluso, 10 mm. latum ; alae 16 mm. longae, 4 mm. latae, apice integrae, auricula angustissima 3 mm. longa, ungui 5.5 mm. longo ; carina 15 mm. longa, 4 mm. lata, obtuse auriculata, ungui 6 mm. longo. *Stamina* diadelpha. *Ovarium* longe pilosum, stipite 6 mm. longo ; stigma pilis brevibus cinctum.

Western China : alt. 3900 m. " Flowers bronzy yellow, on heaths." Wilson, 3424 ! (type), 3445 ! Herb. Kew.

28556 **Astragalus Duclouxii,** N. D. Simpson. Sp. nov., ab *A. monghólico*, Bge., caulibus pilis longis vestitis, calycis dentibus inaequalibus late lanceolatis, bracteis deciduis, vexillo ovato in unguem subito contracto, alis magni-auriculatis distinguendus.

Caulis erectus, ultra 30 cm. altus, leviter striatus, inferne glabrescens, superne pilis albis patulis dense vestitus. *Folia* circa 13-juga, 3 cm. longa, petiolis 1.5 cm. longis ; foliola breviter petiolulata, elliptico-oblonga, mucronulata, ad 15 mm. longa, 7 mm. lata, supra glabrescentia, subtus pilis albis basifixis dense instructa ; stipulae erectae, caulinares, connatae, late ovatae, acuminatae, ad 9 mm. longae, 4.5 mm. latae, supra glabrae subtus margineque pilis paucis vestitae. *Racemi* elongati, multiflori, pedunculis circa 5 cm. longis, pilis albis patulis instructis ; bracteae deciduae, lanceolatae, acuminatae, 4 mm. longae, pilis longis dense vestitae ; bracteolae binae, lineares, parvae, 2 mm. longae ; pedicelli 3 mm. longi, dense pilosi. *Calyx* campanulatus, 6.5 mm. longus, pilis albis longis instructus, dentibus superioribus 3 mm. longis inferioribus vix 4 mm. longis. *Corolla* glabra, calycem superans ; vexillum ovatum, 15 mm. longum (ungui 4 mm. longo incluso) 7 mm. latum, apice emarginatum, alas carinamque subaequans ; alae 15 mm. longae, 2 mm. latae, auricula magna obtusa 2 mm. longa 1.5 mm. lata, ungui 8 mm. longo ; carina vix 15 mm. longa, 3 mm. lata, auricula obtusa, ungui 8 mm. longo. *Stamina* diadelpha. *Ovarium* longe stipitatum, uniloculare, circa 14-ovulatum ; glabrum ; stigma nudum.

Yunnan :—Ducloux, 799 ! Herb. Kew.

Astragalus fangensis, N. D. Simpson. Sp. nov., ab *A. tungense*, N. D. Simpson, foliis pedunculos multo excedentibus, calycis dentibus inaequalibus 0.5–1 mm. longis, vexilli ungui 2 mm. lato, carinae lamina 9.5 mm. longa distinguendus.

Herba caespitosa, multicaulis, rhizomate crasso descendente ; caules ad 11 cm. longi, pilis albis sparse vestiti. *Folia* ad 6 cm. longa, petiolis circa 1 cm. longis inclusis, imparipinnata, 5–8-foliolata ; foliola opposita, obovata, apice retusa, ad 9 mm. longa, 5 mm. lata, supra glabra, subtus margineque pilis albis paucis instructa ; petioluli vix 1 mm. longi, basi glandulis paucis instructi ; stipulae parvae, triangulares, inter se et a petiolis liberae, 2.5 mm. longae, 2 mm. latae. *Racemi* laxi, 3–4-flori, pedunculis brevibus 1–1.3 cm. longis, pilis albis brevissimis sparse instructis ; bracteae vix 1 mm. longae, pedicellos aequantes ; bracteolae nullae. *Calyx* 3 mm. longus, glaber nisi basi albo-hirsutus, dentibus inaequalibus 0.5–1 mm. longis triangularibus acutis sparse albo-hirsutis. *Corolla* tubum multo superans, purpurea (ex *Wilson*) ; vexillum obovatum, 12 mm. longum, 6.5 mm. latum, in unguem 2 mm. latum sensim attenuatum, apice emarginatum ; alae 11 mm. longae, 2.5 mm. latae, lamina supra auriculam obtusam 1 mm. longam gibba, ungui 5.5 mm. longo. *Stamina* diadelpha. *Ovarium* breviter stipitatum, glabrum, pauci-ovulatum ; stigma pilis brevibus cinctum.

C. China : Fang. Flowers purple, growing on rocks. August 1901. Wilson, 2340 ! Herb. Kew.

Astragalus kialensis, N. D. Simpson. Sp. nov., ab *A. galegiforme*, L., habitu laxo, caulibus gracilioribus, racemis multo minoribus ad 2.5 cm. longis, foliolis parvis ad 8 mm. longis cinerascentibus facile distinguendus.

Herba incano-pubescens ; caules ascendentes, superne angulati, flexuosi, parce ramosi, circa 40 cm. longi, pilis brevissimis albis basifixis vestiti. *Folia* ad 5 cm. longa, petiolis circa 6 mm. longis, ad 13-juga ; foliola elliptico-oblonga, obtusa vel acuta, saepe mucronulata, majora 8 mm. longa, 3.5 mm. lata, breviter petiolulata, supra glabra, subtus scabrido-hirsuta ; stipulae caulinares, liberae, ovato-acuminatae. *Racemi* multiflori, pedunculis axillaribus circa 3.5 cm. longis foliis minoribus, pilis nigris albisque sparse instructis ; bracteae 3 cm. longae, lineares, acutae ; bracteolae 2, 2 mm. longae, anguste lineares ; pedicelli 2 mm. longi, dense nigro-hirsuti. *Calyx* campanulatus, 3 mm. longus, sparse nigro-pilosus, dentibus lanceolatis 1.5 mm. latis pilis nigris brevibus instructis. *Corolla* calycem multo excedens, sicco lutea ; vexillum late obovatum, emarginatum, 9.5 mm. longum, 6 mm. latum, in unguem obscurum sensim attenuatum ; alae 8.5 mm. longae, 1.5 mm. latae, ungui 3.5 mm. longo, auricula parva ; carina 7.5 mm. longa, 2.5 mm. lata, apice obtusa, ungui 3.5 mm. longo. *Stamina* diadelpha. *Ovarium* stipitatum, 7-ovulatum, semi-biloculare ; stigma minute capitatum. *Legumen* juvenile glabrum.

Szechuen : Tongolo (Principauté de Kiala). Soulié, 332 ! Herb. Kew.

Astragalus minutebracteolatus, N. D. Simpson. Sp. nov., ab *A. Prattii*, N. D. Simpson, partibus fere omnibus minoribus, foliis 5-foliolatis, stipulis acuminatis, bracteis parvis, bracteolis minutissimis, calycis dentibus tubum aequantibus recedit.

Caulis flexuosus, pilis nigris albisque adpressis parce vestitus. *Folia* parva, 3.2 cm. longa, petiolis 3 mm. longis inclusis, 5-juga ; foliola obovata, majora 8.5 mm. longa, 5 mm. lata, apice saepe retusa, mucronulata, basi fere cuneata, petiolulis 0.5 mm. longis, supra glabra, subtus pilis albis strictis adpressis vestita ; stipulae lanceolatae, acutae, saepe acuminatae, vix 3 mm. longae. *Flores* 2, pedunculis ad 2 cm. longis foliis minoribus, dense nigro-hirsutis ; bracteae lineares, ad 3 mm. longae, nigro-pilosae ; bracteolae 2, minutissimae 0.5 mm. longae ; pedicelli 2 mm. longi, pilis nigris dense vestiti. *Calyx* campanulatus, 3 mm. longus, densissime nigro-hirsutus, dentibus linearibus tubum aequantibus. *Corolla* purpurea (ex *Wilson*) ; vexillum orbiculare, 13 mm. longum, 10 mm. latum, apice emarginatum, in unguem 3 mm. longum sensim attenuatum ; alae 11 mm. longae, 3.5 mm. latae, lamina oblonga apice obtusa basi auriculata, ungui 4 mm. longo ; carina 13 mm. longa, 4 mm. lata, apice obtusa, ungui 4 mm. longo. *Stamina* diadelpha. *Ovarium* pubescens, longe stipitatum, multi-ovulatum ; stigma conspicue barbatum.

W. China : flowers purple ; plants growing on heaths at an altitude of 3300 m. August 1903. Wilson, 3420 ! Herb. Kew.

Astragalus Monbeigii, N. D. Simpson. Sp. nov., ab *A. stricto*, Grah., foliis multo majoribus, pedunculis foliis minoribus, floribus circa 10 mm. longis, calycis dentibus longis subulatis distinguendus.

Herba multicaulis, rhizomate crasso ramoso ; caules adscendentes, striati, pilis albis nigrisque brevibus basifixis vestiti. *Folia* longissima 11 cm. longa, petiolis ad 3.5 cm. longis inclusis, imparipinnata, 5–10-juga ; rhachis saepe sulcata, pilis albis nigrisque laxe instructa ; foliola opposita, inferiora saepe alterna, late lanceolata, apice acuta, mucronulata, basi breviter petiolulata, ad 16 mm. longa, 8 mm. lata, supra glabra vel pilis paucis vestita, subtus cinerascentia margineque pilis albis longiusculis hirsuta; stipulae inter se connatae, petiolis liberae, lanceolatae, acutae, intus glabrae, extra pilis longis vestitae. *Racemi* ad 15-flori, densiusculi; pedunculi circa 9 cm. longi, foliis minores, sparse pilosi; bracteae lineares, acutae, vix 3 mm. longae; bracteolae nullae; pedicelli fere 1.5 mm. longi. *Calyx* breviter campanulatus, 2.5 mm. longus, dentibus anguste subulatis 4.5 mm. longis ut tubo pilis nigris albisque sparse obtectis. *Corolla* calyce multo longior; vexillum late obovatum, apice emarginatum, 10.5 mm. longum, 7 mm. latum, in unguem latum 3 mm. longum contractum; alae 8.5 mm. longae, 2 mm. latae, apice obtusae, basi obtuse auriculatae, ungui 2.5 mm. longo; carina 6 mm. longa, 2.5 mm. lata, ungui 2.5 mm. lata. *Stamina* diadelpha, filamentis inaequaliter connatis. *Ovarium* breviter stipitatum, 6-ovulatum, dense pubescens; stigma minute capitatum.

S.W. China: Monbeig. Herb. Kew.

Astragalus Prattii, N. D. Simpson. Sp. nov., ab *A. camptodonto*, Franch., planta humiliore, bracteolis brevissimis, calycis dentibus subulatis tubo longioribus, ovario pubescente distinguendus, ab *A. Balfouriano*, N. D. Simpson, foliis paucijugis, bracteolis minutis, pedunculis foliis brevioribus recedit.

Herba humilis, rhizomate ramoso gracili; caules breves, decumbentes, circa 6 cm. alti, pilis nigris albisque basifixis adpresse vestiti. *Folia* ad 3.5 cm. longa, petiolis ad 0.5 cm. longis, imparipinnata, 3–7-juga; foliola ovata, obtusa, mucronata, breviter petiolulata, majora 7 mm. longa, 4 mm. lata, supra glabra, subtus pilis albis adpressis instructa; stipulae caulinares, late lanceolatae, acutae, ad 4 mm. longae, glabrescentes. *Racemi* 2–4-flori, pedunculis 2.2 cm. longis foliis brevioribus pilis nigris sparse obtectis; bracteae lineares, 6.5 mm. longae, pilis nigris brevissimis sparse vestitae; bracteolae 2, minutae, circiter 1 mm. longae. *Calyx* campanulatus, 4 mm. longus, dense nigro-pilosus, dentibus linearibus acuminatis ad 5.5 mm. longis. *Corolla* calycem multo excedens; vexillum suborbiculare, 16 mm. longum, circa 14 mm. latum, apice emarginatum, sensim in unguem latum attenuatum, alas carinamque multo superans; alae 13 mm. longae, 5 mm. latae; lamina apice obtusa, fere retusa, inferne obtusissime auriculata, ungui 4 mm. longo; carina 13.5 mm. longa, 4 mm. lata, apice acutiuscula. *Stamina* diadelpha. *Ovarium* stipitatum, pilis paucis vestitum, multi-ovulatum, stigma conspicue barbatum.

Szechuen: Tachien-lu, altitude 2700 to 4050 m. Pratt, 573! Herb. Kew.

Astragalus Purdomii, N. D. Simpson. Sp. nov., ab *A. mongholico,* Bge. calyce bibracteolato, floribus purpurascentibus distinguendus.

Herba erecta ; caulis canaliculatus, pilis albis brevissimis sparse instructus. *Folia* ad 8 mm. longa, petiolis 0.5 cm. longis inclusis, rhachide pilis albis adpresse vestita, circa 15-juga ; foliola inferiora saepe alterna, superiora opposita, ovata vel oblonga, apice obtusa, mucronulata, distincte petiolulata, supra fere glabra, subtus pilis albis adpressis sparse instructa ; stipulae caulinares, inter se liberae, lanceolatae, acutae, ad 4 mm. longae. *Racemi* 6–7-flori, pedunculis 4–5 cm. longis, pilis albis parce vestitis ; bracteae ad 3 mm. longae, lanceolatae, acutae, margine nigro-hirsutae ; bracteolae 2, vix 2 mm. longae ; pedicelli 3 mm. longi, pilis nigris adpressis dense vestiti. *Calyx* campanulatus, circa 6 mm. longus, pilis nigris sparse vestitus, dentibus subulatis ad 2 mm. longis, dense nigro-pilosis. *Corolla* sicco purpurascens, calycis tubum multo superans ; vexillum late obovatum, emarginatum, 17 mm. longum, 8 mm. latum, in unguem 2 mm. longum sensim attenuatum ; alae 15 mm. longae, 3.5 mm. latae, lamina apice rotundata basi obtuse auriculata, ungui 9 mm. longo ; carina 15 mm. longa, 3.5 mm. lata, auricula obtusa 1 mm. longa, ungui 9 mm. longo. *Stamina* diadelpha. *Ovarium* glabrum, uniloculare, longissime stipitatum, circa 10-ovulatum, stylo glabro ; stigma capitatum.

N. China : cultivated by Messrs. Veitch & Sons from seeds collected by Purdom.

38538 **Astragalus saxorum,** N. D. Simpson. Sp. nov., ex descriptione ab *A. mongutense,* Lipsky, floribus 10 mm. longis, bracteis vix 1.5 mm. longis, calyce et tota planta albo-hirsuta recedit ; ab *A. alpino,* Linn., indumento facile distinguendus.

Herba cinerea, partibus omnibus pilis albis dense vestita, rhizomate ramoso crasso ; caules caespitosi, decumbentes, flexuosi, superne canaliculati, circa 20 cm. alti, pilis albis brevibus dense vestiti. *Folia* ad 6 cm. longa, petiolis ad 1.5 cm. longis inclusis, 7–10-juga ; foliola inferiora alterna, oblonga vel obovata, 7 mm. longa, 3 mm. lata, apice saepe retusa, basi cuneata, breviter petiolulata, utrinque albo-hirsuta ; stipulae triangulares, reflexae, acutae, 3 mm. longae, 3 mm. latae, supra glabrae subtus dense hirsutae. *Racemi* densiusculi, ad 16-flori, pedunculis 3.5 cm. longis folia subaequantibus ; bracteae brevissimae, circa 1 mm. longae, pedicellos subaequantes. *Calyx* campanulatus, 2.5 mm. longus, dentibus acuminatis inaequalibus tubum subaequantibus. *Corolla* pallido-purpurea (ex *Wilson*) ; vexilli lamina suborbicularis, in unguem angustum contracta, 8 mm. longa, 6 mm. lata, ungui 2 mm. longo, apice emarginata ; alae 8.5 mm. longae, 1.5 mm. latae, apice obtusae, basi obtuse auriculatae, ungui 3.5 mm. longo ; carina 9.5 mm. longa, 3 mm. lata, ungui 3.5 mm. longo. *Stamina* diadelpha, filamentis inaequaliter connatis. *Ovarium* breviter stipitatum, dense albo-pubescens, multi-ovulatum ; stigma laterale.

Szechuen : flowers pale purple, growing in dry stony places. Wen-chuan. Alt. 900 to 1500 m. 30th May 1908. Wilson, 3789 ! Herb. Kew.

Astragalus Souliei, N. D. Simpson. Sp. nov., ab *A. wushanico*, N. D. Simpson, habitu gracillimo, caule pilis albis adpressis vestito, calycis dentibus inferioribus tubum subaequantibus, vexillo 7 mm. lato, alarum lamina unguem excedente distinguendus.

Herba gracillima, rhizomate ramoso descendente, multicaulis ; caules tenues, flexuosi, circa 8 cm. longi, pilis albis basifixis sparse vestiti. *Folia* ad 7 cm. longa, petiolis inclusis, circa 3–6-juga ; foliola opposita, ovato-orbicularia, apice obtusa, mucronulata, subsessilia 6.5 mm. longa, 5 mm. lata, utrinque pilis strictis albis sparsissime instructa ; stipulae inter se connatae, triangulares. *Racemi* laxi, 6-flori, pedunculis ad 7 cm. longis pilis brevissimis sparse instructis ; bracteae lineares, acutae, 3 mm. longae, pedicellis aequilongae ; bracteolae nullae ; pedicelli dense albo-hirsuti. *Calyx* campanulatus, 3.5 cm. longus, pilis paucis vestitus, dentibus inferioribus circa 3 mm. longis superioribus ad 2 mm. longis. *Corolla* calycem multo superans ; vexillum late obcordatum, 11 mm. longum, 7 mm. latum ; alae 10.5 mm. longae, 2.5 mm. latae, lamina acutiuscula basi obtuse auriculata, auricula 1 mm. longa, ungui 4 mm. longo ; carina 9 mm. longa, 2.5 mm. lata, apice obtusa, basi auricula obtusa 1.5 mm. longa, ungui 4 mm. longo. *Stamina* diadelpha, filamentis inaequaliter connatis. *Ovarium* breviter stipitatum, pubescens, 10-ovulatum ; stigma pilis brevissimis instructum.

Szechuen : Ta-tsien-lou. Soulié, 524 ! Herb. Kew.

Astragalus tungensis, N. D. Simpson. Sp. nov., ab *A. sutchuense* Franch., caulibus erectis strictis, foliolis pluribus, pedunculis folia excedentibus, habituque recedit.

Herba perennis, multicaulis ; caules caespitosi, erecti, circa 30 cm. alti, pilis albis brevibus basifixis adpressis laxe vestiti. *Folia* ad 4 cm. longa, petiolis 0.3 cm longis, 8–10-juga ; foliola saepe opposita, late ovata, 6 mm. longa, 5 mm. lata, vel oblonga, 8 mm. longa, 2.5 mm. lata, breviter petiolulata, apice saepe retusa, utrinque pilis albis instructa, supra nigro-viridia, subtus pallidiora ; stipulae caulinares liberae, triangulares, acutae, 3 mm. longae, intus glabrae, extra pilis albis paucis vestitae. *Racemi* laxi, ad 10-flori, pedunculis folia excedentibus ad 5.5 cm. longis ; bracteae lineares, ad 2 mm. longae, pedicellos subaequantes ; bracteolae nullae ; pedicelli ad 2.5 mm. longi. *Calyx* tubulosus, dense albo-hirsutus, 3 mm. longus, dentibus subulatis, superioribus 2 mm. longis, inferioribus 2.5 mm. longis. *Corolla* calycem multo excedens ; vexillum oblongum, apice retusum, 12 mm. longum, 5.5 mm. latum in unguem angustum sensim attenuatum ; alae 10 mm. longae, 2 mm. latae, apice acutae basi auricula obtusa magna 1 mm. longa adjecta, ungui 3 mm. longo ; carina apice obtusa, 12 mm. longa, 3 mm. lata, ungui 4 mm. longo. *Ovarium* breviter stipitatum, multi-ovulatum, pilis minutissimis obscure pilosum ; stigma minute barbatum. *Legumen* angustissimum, acutum, biloculare.

Szechuen : flowers pale yellow, Tung Valley, May 1904. Wilson, 3436 ! Herb. Kew.

Astragalus Veitchianus, N. D. Simpson. Sp. nov., ab *A. frigido*, A. Gray. racemis dense capitatis, bracteis linearibus parvis, calyce superne utrinque piloso, dentibus triangularibus 1.5 mm. longis distinguendus.

Herba glabriuscula, caule robusto valde striato ultra 40 cm. alto glaberrimo. *Folia* circa 14 cm. (petiolis inclusis) longa, 5–7-juga ; foliola oblongo-ovata, majora 3.5 cm. longa, 1.3 mm. lata, apice obtusa, basi acuta, breviter petiolulata, supra glabra, subtus pilis albis longis vestita ; stipulae a petiolis liberae, magnae, late lanceolatae, acutae, 2 cm. longae, circa 8 mm. latae, margine ciliatae. *Racemi* dense capitati, multiflori, pedunculis ad 13 cm. longis canaliculatis pilis nigris paucis instructis ; bracteae lineares, obtusae, ad 1 cm. longae, pilis albis longe ciliatae ; bracteolae nullae ; pedicelli circa 2 mm. longi, pilis nigris dense vestiti. *Calyx* tubuloso-campanulatus, 7 mm. longus, extra pilis nigris paucissimis instructus, intus superne pilis nigris brevissimis dense vestitus, dentibus triangularibus 1.5 mm. longis extra glabris intus dense nigro-pilosis margine pilis albis longis ciliatis. *Corolla* calycem multo excedens, lutea (ex *Wilson*) ; vexillum obovatum, 18 mm. longum, 9 mm. latum, apice emarginatum in unguem sensim attenuatum ; alae curvatae, 18 mm. longae, 2.5 mm. latae, lamina parva apice obtusa, auricula parva, ungui 13 mm. longo ; carina obtusa, 17 mm. longa, 3 mm. lata, ungui 13 mm. longo. *Ovarium* longe stipitatum, dense nigro-hirsutum 6-ovulatum ; stigma nudum.

W. China : flowers yellow, growing in grassland, altitude 3300 to 3600 m. July 1903. Wilson, 3441 ! Herb. Kew.

46 **Astragalus Wilsonii,** N. D. Simpson. Sp. nov., ab *A. Przewalskii*, Bge. planta pedicellis calycis dentibus ovariis exceptis glaberrima, foliolis ovato-oblongis facile distinguendus.

Herba erecta, glandulis conspicuis basi stipularum (et raro petiolulorum) instructa; caulis glaber, canaliculatus, fistulosus, ultra 30 cm. altus. *Folia* laxe 4–7-foliolata, ad 9 cm. longa, petiolis 1.5 cm. longis; foliola opposita, interdum alterna, ovato-oblonga, majora 2.4 cm. longa, 1 cm. lata, apice obtusa, mucronulata breviter petiolulata, petiolulis ad 1.5 mm. longis, glaberrima, subtus pallidiora, nervis prominulis; stipulae magnae, ad 1.5 mm. longae et 8 mm. latae, liberae, caulinares, late ovatae, acutae, saepe reflexae, utrinque glabrae, margine saepe pilis brevissimis minute ciliatae, basi glandulosae. *Racemi* juveniles dense multiflori, deinde laxi, circa 16-flori, pedunculis glabris ad 9.5 cm. longis folia excedentibus; bracteae obovatae, obtusae, ad 7 mm. longae et 3.5 mm. latae, utrinque glabrae, margine ciliatae; bracteolae nullae; pedicelli ad 2.5 mm. longi, pilis nigris brevibus vestiti. *Calyx* campanulatus, glaberrimus, ad 6.5 mm. longus, dentibus aequalibus lanceolatis acutis ad 2.5 mm. longis extra glabris intus pilis nigris dense instructis. *Corolla* lutescens (ex *Wilson*), calycem multo superans; vexillum obovatum, apice emarginatum, 15 mm. longum, 7.5 mm. latum in unguem sensim attenuatum; alae 14.5 mm. longae, 1.5 mm. latae, lamina brevissima basi obtuse auriculata, ungui 9 mm. longo; carina 13.5 mm. longa, 3 mm. lata, ungui 8 mm. longo. *Stamina* diadelpha. *Ovarium* uniloculare, 6-ovulatum, longe stipitatum, dense nigro-pubescens; stigma nudum.

W. China: "Flowers yellowish. Grasslands, altitude 3900 to 4200 m. July 1903." Wilson, 3440! Herb. Kew (type).

Szechuen: Tongolo, Soulié, 303! Ta-tsien-lou, Soulié, 560! Herb. Kew.

When the stipules are erect the base is punctured by an insect, evidently or the purpose of obtaining the fluid secreted by the glands which occur inside the stipules. The glands are also found at the base of the petiolules together with a few hairs.

Astragalus wushanicus, N. D. Simpson. Sp. nov., ab *A. sinico*, Linn., planta perenne, indumente patulo, pedunculis foliis minoribus, vexillo obovato, ungui 2 mm. lato, alis acutis habituque differt.

Herba perennis, rhizomate funiculare descendente; caules caespitosi, parce ramosi, ad 12 cm. longi, pilis albis patulis dense vestiti. *Folia* longipetiolata, ad 14 cm. longa, petiolis 1–4.5 cm. longis inclusis, 5–8-juga; foliola opposita, late obovato-oblonga, majora 10 mm. longa, 8 mm. lata, apice retusa, basi rotundata subsessilia, terminalia petiolulis 2–3 mm. longis, supra glabra, subtus pilis albis sparse obtecta; stipulae triangulares, parvae, inter se connatae, a petiolis liberae, margine pilis albis ciliatae. *Racemi* laxi, pauciflori; pedunculi 3 mm. longi, foliis multo minores; bracteae lineares, acutae, 1.5 mm. longae; bracteolae nullae; pedicelli 2.5 mm. (deinde ad 4 mm.) longi, dense albo-pilosi. *Calyx* breviter campanulatus, 3 mm. longus, dentibus subulatis inaequalibus 0.5–1.5 mm. longis ut tubo pilis albis basifixis sparse vestitis. *Corolla* calycem multo excedens; vexillum anguste obovatum, 11.5 mm. longum, 5 mm. latum, apice emarginatum, in unguem 2 mm. latum sensim attenuatum; alae 11 mm. longae, 1.5 mm. latae, lamina apice acuta basi auricula obtusa 1 mm. longa instructa, ungui 5.5 mm. longo; carina 10 mm. longa, 2.5 mm. lata, ungui 5.5 mm. longo. *Stamina* diadelpha filamentis inaequaliter connatis. *Ovarium* breviter stipitatum, pubescens, multi-ovulatum; stigma pilis brevissimis instructum. *Legumen* uniloculare, strigillosum, apice basique acutum.

Szechuen: N. Wushan. "A plant with pink flowers growing in clefts of the cliffs, rare." Henry, 7071! Herb. Kew.

Astragalus yangtzeanus, N. D. Simpson. Sp. nov., ab *A. sutchuense,* Franch., foliis 6–9-jugis, foliolis angustioribus rarissime retusis, calycibus majoribus, vexilli lamina in unguem latum sensim attenuata, carinae lamina multo minore, ovario dense albo-piloso distinguendus.

Herba, radice tenui ramoso, multicaulis; caules decumbentes, flexuosi, graciles, circa 25 cm. alti, pilis albis brevibus parce vestiti. *Folia* fere 5 cm. longa, saepe sessilia, rhachide basi petiolulorum pilis glandulosis instructo, ad 9-juga; foliola anguste oblonga, 8 mm. longa, 3 mm. lata, apice acutiuscula, basi subcuneata, brevissime petiolulata, utrinque pilis paucis albis obtecta; stipulae triangulares, acuminatae, ad 4.5 mm. longae, supra glabrae, subtus margineque pilosae, inter se liberae. *Racemi* laxi, ad 9-flori, pedunculis folia subaequalibus 2–3 cm. longis; bracteae filiformes, circa 2 mm. longae; bracteolae nullae, pedicelli dense albo-hirsuti, circa 2 mm. longi. *Calyx* campanulatus, 4 mm. longus, albo-pilosus, dentibus subulatis inaequalibus 1.5–2.5 mm. longis. *Corolla* calycem multo excedens, alba (ex *Wilson*); vexillum obovatum, emarginatum, 12 mm. longum, 5 mm. latum, in unguem latum sensim attenuatum; alae 10.5 mm. longae, 2 mm. latae, apice acutae, basi auriculatae, ungui 5 mm. longo; carina apice obtusa, 10 mm. longa, 2 mm. lata, ungui 5 mm. longo. *Ovarium* dense albo-pubescens, breviter stipitatum, stylo longo glabro; stigma brevissime pilosum.

Szechuen: growing on the bank of the Yangtze River near Lu-chou at 100–300 m. April 1908. Wilson, 3764 Herb. Kew.

The glands found in this species are similar to those found in *A. Wilsonii*, m., and *A. fangensis*, m. They are apparently confined to the base of the stipules and petiolules.

B. SYNOPSIS SPECIERUM SINENSIUM.

Subgenus I.

Phaca, Bge. pro parte maxima.

Plantae herbaceae, annuae vel biennes vel perennes, inermes, caulescentes vel acaules, semper pilis basifixis instructae. *Flores* pedicellati, flavi, ochroleuci vel purpurei. *Calyx* persistens, campanulatus vel subtubulosus. *Corolla* decidua. *Stamina* diadelpha, rarissime monadelpha. *Stigma* nudum vel barbatum vel pilis minutissimis instructum.

Sect. 1. UMBELLATAE, N. D. Simpson.

Herbae annuae, biennes vel perennes, caulescentes. *Flores* umbellati vel subumbellati, purpurascentes vel raro albi. *Ovarium* subsessile. *Stigma* pilis minutis instructum.

1. **Astragalus sinicus,** L. Mant. i, 103 (1767); Bge. Astrag. Sp. Geront. ii, 2 (1869); * Forbes et Hemsl. in Journ. Linn. Soc. xxiii, 166 (1887); Franch. Pl. Delav. 160 (1889); Dunn et Tutcher, Fl. Kwangtung, in Kew Bull. Ad. Ser. x, 77 (1912).

Yunnan: Meng-tze, Hancock, 90! Meng-tze, 1380 m., Henry, 9356!; 1500 m., Henry, 9356A! Wang-chau, Delavay, 1963! Yunnan-sen, Maire, 434!, 861!, 1771! Tali Valley, 2010–2400 m., Forrest, 4222! Tengyueh Valley, 1800 m., Forrest, 4987! Herb. Kew. et Edin.

Kwangtung: Fatshan, Wenyon! Herb. Kew.

Fokien: Lover's Leap, Foochow, Carles, 827! Herb. Kew. et Edin.

Chekieng: Ningpo, A. K. Schindler, 447!; Everard!; Oldham, 47! Herb. Kew. et Edin.

Hupeh: Patung district, Henry, 3771! Ichang, Henry, 657!, 1137! Nanto, Wilson, 11! Hankow, Carles! Herb. Kew. et Edin.

Kiangsu: Shanghai, Wykeham-Perry!; Maingay, 514!; Carles, 280!; Bisset! Herb. Kew. et Edin.

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* For the full reference see Bibliography.

China: (without definite locality) Herb. Linn.!; Pallas!; Fortune, A 82!; Herb. Jorsyth!; Lindley!; Talbot in Herb. Sims! Herb. Kew. et Linn. et Cantab.

var. **macrocalyx,** Ulbrich in Engl. Jahrb., xxxvi, Beibl. 82, 60 (1905) pro parte maxima.

Hupeh: W. Hupeh, Wilson, 331! Patung District, Henry, 4067!, 5504! Ichang district, Henry, 3459! Herb. Kew. et Edin.

The variety is more robust than the type; there are no adventitious roots on the stems, the flowers are white, the calyx teeth are longer and are subulate, the lamina of the standard is gradually attenuated into the unguis, the wings are retuse at the apex, and the carina is narrower.

2. **Astragalus wushanicus,** N. D. Simpson. Sp. nov.

Szechuen: N. Wushan, Henry, 7071! Herb. Kew.

3. **Astragalus sciadophorus,** Franch. Pl. David. i, 84 (1884);* Forbes et Hemsl. in Journ. Linn. Soc. xxiii, 166 (1887).

Chihli: Jehol, David cum 2151 mixtus! Herb. Paris.

Sect. 2. DAHURICAE, N. D. Simpson.

Herbae caulescentes, erectae. *Flores* dense spicato-racemosi. *Calycis* dentes valde inaequales. *Stigma* pilis minutis instructum. *Legumen* erectum, arcuatum, complete biloculare.

4. **Astragalus dahuricus,** DC. Prodr. ii, 285 (1825); Bge. Astrag. Sp. Geront. ii, 3 (1869); Franch. Pl. David. i, 86 (1884); Forbes et Hemsl. in Journ. Linn. Soc. xxiii, 165 (1887).

Shantung: Maingay, 44! Chefoo, Faber, 247! Herb. Kew.

Chihli: Peking, Bretschneider!, Hemeling! Tai-han-ling, Bullock, 19!; Carles! Miao-feng-shan, Carles! Herb. Kew. et Edin.

Shinking: Moukden, Webster, 140! Sungari River, H. E. M. James! Herb. Kew.

Sect. 3. OLIGANTHAE, N. D. Simpson.

Herbae perennes, caulescentes, caulibus elongatis. *Stipulae* minutae. *Racemi* pauciflori, axillares. *Bracteae* subulatae, minutae; bracteolae nullae. *Vexillum* late obcordatum. *Stigma* conspicue barbatum. *Legumen* rectum, acutum.

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* For the full reference see Bibliography.

5. **Astragalus complanatus,** R. Brown ex Bge. Astrag. Sp. Geront. ii, 1 (1869); Franch. Pl. David. i, 84 (1884); Forbes et Hemsl. in Journ. Linn. Soc. xxiii, 165 (1887).

Chihli: Peking hills, Carles! Herb. Edin.
N. China: Tatarinow! sub *A. oligantho,* Horan. Herb. Kew.
China: Staunton! Mus. Brit.

It is uncertain why Bunge associated R. Brown's name with this species. The "complanatus" written on the sheet of specimens in the British Museum collected by Staunton is not in the handwriting of R. Brown.

Sect. 4. BIBRACTEOLATAE, N. D. Simpson.

Herbae perennes, caulescentes. *Stipulae* a petiolo liberae. *Racemi* capitati, saepe pauciflori, axillares, pedunculati. *Bracteae* persistentes; bracteolae duae. *Calyx* campanulatus. *Corolla* calycem semper multo excedens, lutea vel purpurascens. *Vexillum* magnum plerumque suborbiculare, semper latum. *Ovarium* stipitatum. *Stigma* conspicue barbatum (sub oculo nudo).

6. **Astragalus camptodontus,** Franch. Pl. Delav. 160 (1889) pro parte maxima; Forbes et Hemsl. in Journ. Linn. Soc. xxxvi, 459 (1904) pro parte.

Yunnan: Yen-tze-hay, 2700 m., Delavay, 1962!; 1969! (*non* 936!). Herb. Paris. et Kew.

No. 936 differs from the type (in several characters), and constitutes the new species *A. camptodontoides.*

7. **Astragalus camptodontoides,** N. D. Simpson. Sp. nov.

Yunnan: Lon Kong, Delavay, 936! Herb. Kew.

8. **Astragalus Balfourianus,** N. D. Simpson. Sp. nov., in Notes Bot. Gard., Edin., viii, p. 123 (1913).

Yunnan: at an altitude of 3600 m. on the eastern flank of the Lichiang Range, Forrest, 6606! (type). 3600–3900 m., Forrest, 6514! 3300–3600 m., Forrest, 2745! Herb. Edin.

9. **Astragalus tanguticus,** Batalin in Act. Hort. Petrop. xi, 485 (1891); Forbes et Hemsl. in Journ. Linn. Soc. xxxvi, 459 (1904).

Kansu: Tangut, Grum-Grshmailo! Herb. Hort. Petrop.

10. **Astragalus minutebracteolatus,** N. D. Simpson. Sp. nov.

W. China: at an altitude of 3300 m., Wilson, 3420! Herb. Kew.

The specimens representing this species are mounted on the same sheet with a *Gueldenstaedtia*, and there are two labels with no distinguishing mark to show to which specimens they may belong. No. 3420 was collected in July in W. China, and is stated to have purple flowers, whereas No. 1753 is from Central China and was collected in March. From these facts the writer is inclined to believe that No. 3420 refers to the *Astragalus* rather than to the *Gueldenstaedtia*.

11. **Astragalus Prattii,** N. D. Simpson. Sp. nov.

Szechuen : Ta-chien-lu, Pratt, 573 ! Herb. Kew.

12. **Astragalus dolichochaete,** Diels in Notes Bot. Gard., Edin., v, 245 (1912).

Yunnan : on the eastern flank of the Lichiang Range, 2700–3300 m., Forrest, 2608 ! Herb. Edin.

13. **Astragalus lichiangensis,** N. D. Simpson. Sp. nov., in Notes Bot. Gard., Edin., viii, p. 125 (1913).

Yunnan : on the eastern flank of the Lichiang Range at an altitude of 3000 m. Lat. 27° 25′ N., Forrest, 5920 ! Herb. Edin.

Sect. 5. EBRACTEOLATAE, N. D. Simpson.

Herbae perennes, caulescentes. *Stipulae* inter se liberae vel inferiores breviter connatae. *Racemi* pauciflori, breviter pedunculati, axillares. *Bracteae* persistentes, bracteolae nullae. *Calyx* campanulatus. *Corolla* lutea vel purpurascens. *Vexillum* obovatum ; alae longi-auriculatae. *Ovarium* pilosum, longe stipitatum ; stigma barbatum.

14. **Astragalus Craibianus,** N. D. Simpson. Sp. nov.

W. China : at an altitude of 3900 m., Wilson, 3424 ! (type), 3445 ! Herb. Kew.

15. **Astragalus coronilloides,** Ulbrich in Engler Bot. Jahrb., vol. l, Beibl. 110, p. 14.

Szechuen : W. Hupeh, Wilson, 2286 ! Herb. Kew. et Edin. ; Fang, Wilson, 2386 ! Herb. Berol.

Sect. 6. HEMIPHRAGMIUM, Bge.

Herbae caulescentes. *Stipulae* a petiolo liberae. *Racemi* axillares, floribus plerumque purpurascentibus. *Calyx* campanulatus. *Stamina* diadelpha vel raro monadelpha. *Ovarium* stipitatum ; stigma nudum vel pilis minutis obscure instructum.

16. **Astragalus Souliei,** N. D. Simpson. Sp. nov.

Szechuen: Ta-tsien-lu, Soulié, 524! Herb. Kew.

17. **Astragalus sutchuensis,** Franch. Pl. Delav. 160 (1889); Forbes et Hemsl. in Journ. Linn. Soc. xxxvi, 459 (1904).

Szechuen: Tchong-kin, Delavay, 2294! Mount Omei, 1050 m., Faber, 750!, 753!; Henry, 8979! Herb. Paris. et Kew.

Hupeh: Ichang, Henry, 763!, 764!, 1352! Patung, Yangtze, Wilson, 383A!, 3443! Ningpo Mts., Faber! Nanto Henry, 6374! Herb. Kew.

Cult. Messrs. Veitch & Sons from seeds collected by Wilson, 1660! Herb. Kew.

18. **Astragalus tungensis,** N. D. Simpson. Sp. nov.

Szechuen: Tung Valley, Wilson, 3436! Herb. Kew.

19. **Astragalus fangensis,** N. D. Simpson. Sp. nov.

Central China: Fang, Wilson, 2340! Herb. Kew.

20. **Astragalus yangtzeanus,** N. D. Simpson. Sp. nov.

Szechuen: on the banks of the Yangtze River, Lu-chou, Wilson, 3764! Herb. Kew.

21. **Astragalus saxorum,** N. D. Simpson. Sp. nov.

Szechuen: Wen chuan, alt. 900–1500 m., Wilson, 3789! Herb. Kew.

22. **Astragalus pullus,** N. D. Simpson. Sp. nov. in Notes Bot. Gard., Edin., viii, p. 125 (1913).

Yunnan: alt. 3000–3150 m. on the eastern flank of the Lichiang Range. June 1906. Forrest, 2379! Herb. Edin. et Kew.

23. **Astragalus Monbeigii,** N. D. Simpson. Sp. nov.

S.W. China: Monbeig! Herb. Kew.

24. **Astragalus nigrescens,** Franch. Pl. Delav. 162 (1890); Forbes et Hemsl. in Journ. Linn. Soc. xxxvi, 459 (1904).

Yunnan: Mt. Hee-chan-men, above Lan-kong, 3000 m., Delavay, 1684! Herb. Kew.

25. **Astragalus polycladus,** Bur. et Franch. in Journ. de Bot. v, 23 (1891); Forbes et Hemsl. in Journ. Linn. Soc. xxxvi, 459 (1904).

Szechuen: Ta-tsien-lu, Bonvalot et Prince Henri!; Soulié, 828 ! ; 2700–4050 m., Pratt, 210 ! Tongolo Soulié, 700 ! Herb. Paris. et Kew.

W. China : 2400 m., Wilson, 3442 ! ; 3000–3300 m., Wilson, 3439 ! Herb. Kew.

26. **Astragalus tataricus,** Franch. Pl. David. i, 87 (1884) ; Forbes et Hemsl. in Journ. Linn. Soc. xxiii, 167 (1887).

A. hippocrepidis, Dunn in Journ. Linn. Soc. xxxix, 421 (1911) *non* Benth.

Chihli : Jehol, David, 2151 ! Herb. Paris.
Kansu : Tangut, Przewalski ! Herb. Kew.

27. **Astragalus Davidii,** Franch. Pl. David. ii, 32 (1885) ; Forbes et Hemsl. in Journ. Linn. Soc. xxxvi, 459 (1904).

Szechuen : Moupin, David ! Herb. Paris.

28. **Astragalus chrysopterus,** Bge. in Mél. Biol. x, 51 (1877) ; * Forbes et Hemsl. in Journ. Linn. Soc. xxiii, 165 (1887).

Kansu : Przewalski, 164 ! Herb. Hort. Petrop.
N. China : Potanin ! Herb. Hort. Petrop.

29. **Astragalus Hancockii,** Bge. in Mél. Biol. x, 640 (1877) ; Forbes et Hemsl. in Journ. Linn. Soc. xxiii, 165 (1887).

Chihli : Siao-wu-tai-shan, Hancock ! , Moellendorff !. Herb. Hort. Petrop.

30. **Astragalus monadelphus,** Bge. in Mél. Biol. x, 52 (1877) ; Forbes et Hemsl. in Journ. Linn. Soc. xxiii, 166 (1887).

Kansu : Przewalski ! Herb. Hort. Petrop.

31. **Astragalus Przewalskii,** Bge. in Mél. Biol. x, 52 (1877) ; Forbes et Hemsl. in Journ. Linn. Soc. xxiii, 166 (1887).

Szechuen : Potanin ! Herb. Hort. Petrop.
Kansu : Tangut province, Przewalski, 263 ! Herb. Hort. Petrop.

Sect. 7. SKYTHROPOS, N. D. Simpson.

Herbae subacaules. *Racemi* conferti, interdum subumbellati, pedunculis scapiformibus. *Flores* purpurei vel lutei. *Bracteolae* duae vel nullae. *Calyx* campanulatus longe pilosus. *Ovarium* stipitatum.

32. **Astragalus skythropos,** Bge. in Mél. Biol. x, 51 (1877) ; Forbes et Hemsl. in Journ. Linn. Soc. xxiii, 166 (1887).

Kansu : Tangut, Przewalski ! Khan-czuk, 4100 m. ; Szi-ning-fu, L. de Loczy, 24B ! Herb. Kew. et Budapest.

* For the full reference see Bibliography.

33. **Astragalus tatsiensis,** Bur. et Franch. in Journ. de Bot. v, 23 (1891); Forbes et Hemsl. in Journ. Linn. Soc. xxxvi, 459 (1904).

Szechuen: Ta-tsien-lou, Bonvalot et Prince Henri! Tongolo, Soulié, 710! Herb. Paris. et Kew.

34. **Astragalus yunnanensis,** Franch. Pl. Delav. 162 (1890); Forbes et Hemsl. in Journ. Linn. Soc. xxxvi, 459 (1904).

Yunnan: Lichiang, Delavay, 252! Eastern flank of the Lichiang Range, alt. 3300 m., Forrest, 2750! alt. 3600–3900 m., Forrest, 5995! Herb. Paris. et Kew. et Edin.

forma **elongatus,** N. D. Simpson, forma nov.

Planta caulibus elongatis, foliis utrinque pilosis, ovario turgido.

Yunnan: N.W., alt. 4800 m., F. Kingdon Ward, 26! Herb. Edin.

The bracteoles in this species may be deciduous as they are sometimes absent.

There was formerly some doubt as to the genus of this species, but the writer has seen fruiting specimens of this (or an allied) species from Kumaon which undoubtedly refer it to the genus *Astragalus.*

Sect. 8. HEMIPHACA, Bge.

Herbae caulescentes. *Stipulae* a petiolo liberae. *Racemi* multiflori, floribus purpurascentibus vel ochroleucis, carina violaceo-picta. *Calyx* campanulatus. *Ovarium* sessile. *Stigma* nudum.

35. **Astragalus capillipes,** Fisch. ex Bge. Astrag. Sp. Geront. ii, 21 (1869); Franch. Pl. David. i, 85 (1884); Forbes et Hemsl. in Journ. Linn. Soc. xxiii, 165 (1887).

Chihli: near Peking, Fangshan, Carles!; near Peking, Bushell! Herb. Kew. et Edin.

N. China: Tatarinow, sub *A. indigoferoidc,* Horan! Herb. Kew.

36. **Astragalus melilotoides,** Pall. Astrag. 51 (1800), t. 41; Bge. Enum. Pl. Chin. Bor. 17 (1834); * Bge. Astrag. Sp. Geront. ii, 21 (1869); Forbes et Hemsl. in Journ. Linn. Soc. xxiii, 166 (1887).

A. tenuis, Turcz. in Bull. Soc. Nat. Mosc. 90 (1838) nomen; Turcz. Fl. Baic-Dahur. i, 324 (1842); Bge. Astrag. Sp. Geront. ii,

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* For the full reference see Bibliography.

21 (1869); Franch. Pl. David. i 85 et 86 (1884); Forbes et Hemsl. in Journ. Linn. Soc. xxiii, 167 (1887).

Kansu: Kazan, L. de Loczy, 197b.! Herb. Budapest.

Shensi: Hort. Kew. seeds from Piccolo, 218! Herb. Kew.

Chihli: Peking, Bretschneider!; Bushell!; Williams in Herb. Hance, 11,456!, 12,469! Jehol, David in Herb. Hance, 12,469! Herb. Kew.

Shantung: hills near Chi-ning-chow, F. N. Meyer, 254! Herb. Kew.

W. China: 2100 m. alt., Wilson, 3431! Herb. Kew.

37. **Astragalus dependens,** Bge. in Mél. Biol. x, 640 (1877); Forbes et Hemsl. in Journ. Linn. Soc. xxiii, 165 (1887).

Kansu: Piasezky! Herb. Hort. Petrop.

38. **Astragalus Loczii,** Kanitz.* Pl. Exped. Szechenyi, Asia Centr. 17 (1891); Forbes et Hemsl. in Journ. Linn. Soc. xxxvi, 459 (1904).

Kansu: Nan-san, L. de Loczy, 78! Herb. Budapest.

Sect. 9. POLYPHYLLAE, N. D. Simpson.

Herbae perennes, caulescentes, erectae. *Racemi* laxi, pauciflori. *Flores* bibracteolati, sicco purpurei; pedunculi foliis minores. *Ovarium* uniloculare, glabrum, longe stipitatum, stipite calycem multo excedente.

39. **Astragalus Purdomii,** N. D. Simpson. Sp. nov.

N. China: cultivated by Messrs. Veitch & Sons from seeds collected by Purdom.

Sect. 10. CENANTRUM, Bge.

Herbae caulescentes, erectae. *Stipulae* a petiolo liberae. *Racemi* longe pedunculati, conferti vel elongati, interdum subumbellati. *Bracteae* persistentes rarissime (cf. *A. Duclouxii*) caducae; bracteolae nullae. *Calyx* campanulatus. *Corolla* flava vel ochroleuca. *Ovarium* stipitatum, uniloculare; stigma nudum.

40. **Astragalus Henryi,** Oliver in Hook. Icon. Plant. xx, 1959 (1891); Forbes et Hemsl. in Journ. Linn. Soc. xxxvi, 459 (1904).

Neodielsia polyantha, Harms in Engl. Jahrb. xxxvi, Beibl. 82, p. 68 (1905)—fide Ulbrich in Engl. Jahrb. l, Beibl. 110, p. 16 (1913).

Hupeh: Henry, 6902!; Wilson, 2373! Herb. Kew. et Edin.

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* Var. *scaposa*, Kanitz = *Oxytropis Kanitzii*, N. D. Simpson, comb. nov.

41. **Astragalus Duclouxii,** N. D. Simpson. Sp. nov.
Yunnan: Ducloux, 799! Herb. Kew.

42. **Astragalus Wilsonii,** N. D. Simpson. Sp. nov.

Szechuen: Tongolo, Soulié, 303! Ta-tsien-lu, Soulié, 560! Herb. Kew.

W. China: 3900–4200 m., Wilson, 3440! (type). Herb. Kew.

43. **Astragalus Moellendorffii,** Bge. in Mél. Biol. x, 641 (1877); Forbes et Hemsl. in Journ. Linn. Soc. xxiii, 166 (1887).

Chihli: Siao-wu-tai-shan, Moellendorff!, Hancock! Herb. Hort. Petrop.

44. **Astragalus frigidus,** A. Gray in Proc. Amer. Acad. vi, 219 (1864).

Sungari River near Kirin, H. E. M. James! Herb. Kew.

45. **Astragalus Veitchianus,** N. D. Simpson. Sp. nov.
W. China: alt. 3300–3600 m., July 1903, Wilson, 3441! Herb. Kew.

46. **Astragalus tongolensis,** Ulbrich in Engl. Bot. Jahrb. l. Beibl. 110, p. 12.

Tachienlu, Soulié, 2409! Tongolo, Tcheto, Soulié, 2523! Olongche, Soulié, 2524! Herb. Berol.

47. **Astragalus floridus,** Benth. ex Bge. Astrag. Sp. Geront. ii, 28 (1869); Baker in Hook. fil. Fl. Brit. Ind. ii, 127 (1876); Dunn in Journ. Linn. Soc. xxxix, 421 (1911).

Szechuen: Tachienlu, 2700–3050 m., Pratt, 549! Soulié, 537! Herb. Kew.
W. China: 3150 m., Wilson, 3444! Herb. Kew.

Sect. 11. CENANTROIDES, N. D. Simpson.

Herbae caulescentes, erectae. *Racemi* densiflori, pedunculis folia subaequantibus. *Flores* bibracteolati, flavi. *Calyx* subtubulosus, dentibus parvis dense nigro-pilosis. *Ovarium* stipitatum, uniloculare, dense pubescens.

48. **Astragalus Arnoldianus,** N. D. Simpson. Sp. nov.
Szechuen: Wilson, 3797! Herb. Kew.

Sect. 12. NIGRICANTES, N. D. Simpson.

Herbae perennes, caulescentes, erectae, caulibus pilis nigris dense vestitis. *Racemi* densiflori, terminales. *Flores* lutei, bibracteolati; bracteae persistentes. *Ovarium* sessile, glabrum, semi-biloculare.

49. **Astragalus Forrestii,** N. D. Simpson. Sp. nov., in Notes Bot. Gard., Edin., viii, p. 124 (1913).

Yunnan: western flank of the Lichiang Range. Lat. 27° 25′ N., 3300 m. June 1910, Forrest, 6041! Herb. Edin.

Sect. 13. DIPLOTHECAE, Bge.

Herbae perennes subglabrae vel incano-pubescentes. *Stipulae* liberae. *Bracteae* persistentes; bracteolae duae. *Flores* flavi; pedunculi axillares. *Calyx* campanulatus. *Ovarium* longe stipitatum, biloculare vel semi-biloculare; stigma nudum.

50. **Astragalus graveolens,** Buch-Ham. Wall. Cat. 5929 ex Bge. Astrag. Sp. Geront. ii, 31 (1869); Baker in Hook. fil. Fl. Brit. Ind. ii, 131 (1876); Franch. Pl. Delav. 163 (1890); Forbes et Hemsl. in Journ. Linn. Soc. xxxvi, 459 (1904).

Yunnan: Hoang-kia-piu, near Ta-li, Delavay, 1133! Herb. Kew.

51. **Astragalus moupinensis,** Franch. Pl. David. ii, 31 (1885); Forbes et Hemsl. in Journ. Linn. Soc. xxxvi, 459 (1904).

Szechuen: Moupin, Houng-thin-chan, David, 142! Herb. Paris.

52. **Astragalus kialensis,** N. D. Simpson. Sp. nov.

Szechuen: Tongolo, Soulié, 332! Herb. Kew.

53. **Astragalus chinensis,** Linn. fil. Dec. Pl. Rar. i, 5 (1762), t. 3; Linn. Sp. Pl. Ed. ii, 1066 (1763); Bge. Astrag. Sp. Geront. ii, 32 (1869); Forbes et Hemsl. in Journ. Linn. Soc. xxiii, 165 (1887).

Chihli: Tientsin, Carles!; T. L. Bullock, 97! Herb. Kew. et Edin.

Shinking: west of Chienshan, Ross, 538! Herb. Kew.

Mi-hai city-plain, Faber, 1648! Herb. Kew.

Sect. 14. CHLOROSTACHYS, Bge.

Herbae affines sect. 10 Cenantro sed fructu biloculare et bracteis caducis. *Bracteolae* duae. *Flores* flavescentes vel ochroleuci. *Calyx* campanulatus. *Ovarium* stipitatum, biloculare; stigma nudum.

7 54. **Astragalus Englerianus,** Ulbr. in Eng. Jahrb. xxxvi, Beibl. 82, 60 (1905); Dunn in Journ. Linn. Soc. xxxix, 421 (1911).

Yunnan: Mengtze, 2100 m., Henry, 9783!; 1800 m., 9783A! Herb. Berol. et Kew.

Cult. Hort. Kew! Herb. Kew.

Sect. 15. MYOBROMA, Bge.

Herbae acaules, pube alba. *Stipulae* petiolo adnatae. *Racemi* subsessiles pauciflori. *Bracteae* membranaceae ; bracteolae nullae. *Calyx* tubulosus. *Corolla* flava ; stigma nudum.

55. **Astragalus acaulis,** Baker in Hook. fil. Fl. Brit. Ind. ii, 132 (1876).

A. litangensis, Bur. et Franch. in Journ. de Bot. v, 24 (1891) ; Forbes et Hemsl. in Journ. Linn. Soc. xxxvi, 459 (1904).

Yunnan : on the western flank of the Lichiang Range, 3300–3600 m., Forrest, 5763 ! A-tun-tsi, 4200–4500 m., Kingdon Ward, 30 ! Herb. Edin.

Szechuen : Litang, Bonvalot et Prince Henri ! Tongolo, Soulié, 711 ! Herb. Paris. et Kew.

There is considerable variation in the amount of indumentum in these specimens, but in each case where it is present the type of hair is the same. The specimen from Tongolo is more hairy and has slightly smaller flowers than the type specimen and those from Yunnan.

PLANTA INCERTAE SEDIS.

56. **Astragalus glanduliferus,** Debeaux. Fl. Tientsin, 16 (1879) ; Forbes et Hemsl. in Journ. Linn. Soc. xxiii, 165 (1887).

Chihli : Tientsin, Peiho river, Debeaux.

The author of this species gives as its affinities *A. melilotoides* and *A. chinensis* ; but it is impossible from the description alone to decide to which section it rightly belongs.

Subgenus II.

Cercidothrix, Bge.

Plantae herbaceae vel suffruticosae, perennes, caulescentes vel subacaules, inermes, pilis medifixis vestitae. *Flores* racemosi vel capitati, lutei vel purpurascentes. *Calyx* campanulatus vel tubulosus. *Petala* glabra. *Legumina* saepissime bilocularia.

Sect. 1. EUODMUS, Bge.

Herbae perennes, caulibus erectis. *Calyx* tubuloso-campanulatus. *Flores* flavescentes. *Ovarium* glabrum. *Legumina* erecta.

57. **Astragalus uliginosus,** Linn. Sp. Pl. 757 (1753) ; Bge. Astrag. Sp. Geront. ii, 168 (1869).

Shinking : Chang-pei-shan, 300–2250 m., H. E. M. James ! Herb. Kew.

Sect. 2. CRACCINA, Bge.

Plantae caulescentes, basi sublignescentes. *Calyx* campanulatus. *Flores* laxe racemosi, purpurascentes. *Legumina* recta.

58. **Astragalus Biondianus,** Ulbrich in Engl. Jahrb. xxxvi, Beibl. 82, 62 (1905) ; Dunn in Journ. Linn. Soc. xxxvi, 421 (1911).

Shensi : In-fan-to, Giraldi, 4244 ! Herb. Berol.

59. **Astragalus variabilis,** Bge. in Mél. Biol. x, 53 (1877).

Kansu : Kan-scou-fu, L. de Loczy ! Herb. Budapest.

Forbes et Hemsl. in Journ. Linn. Soc. xxiii, 167 (1887), refer to a specimen collected outside China.

Sect. 3. ORNITHOPODIUM, Bge.

Plantae herbaceae, basi saepe sublignescentes, caulescentes. *Calyx* campanulatus. *Flores* racemosi, purpurascentes. *Legumina* arcuata.

60. **Astragalus leansanicus,** Ulbrich in Engl. Jahrb. xxxvi, Beibl. 82, 62 (1905) ; Dunn in Journ. Linn. Soc. xxxix, 421 (1911).

A. Stevenianus, Ulbrich l.c. et Dunn l.c. *non* DC. Shensi : Lean-san, Giraldi, 4241 ! Po-uo-li, Giraldi, 7060 ! Ki-fan, Giraldi, 705 ! Herb. Berol.

61. **Astragalus longispicatus,** Ulbrich in Engl. Jahrb. xxxvi, Beibl. 82, 61 (1905) ; Dunn in Journ. Linn. Soc. xxxix, 421 (1911).

Shensi : Luo-y-san, Giraldi, 4256 ! Herb. Berol.

Sect. 4. ONOBRYCHIUM, Bge.

Plantae herbaceae. *Stipulae* a petiolo liberae. *Pedunculi* axillares. *Bracteolae* nullae. *Flores* dense capitati, purpurascentes. *Legumina* bilocularia, erecta.

62. **Astragalus adsurgens,** Pall. Sp. Astrag. 40, t. 31 (1800) ; Bge. Enum. Pl. Chin. Bor. 17 (1834) ; Bge. Astrag. Sp. Geront. ii, 184 (1869) ; Franch. Pl. David. i, 88 (1884) ; Forbes et Hemsl. in Journ. Linn. Soc. xxiii, 164 (1887).

Chihli : Mong-tchun, F. N. Meyer, 301 ! Peiho River, Moellendorff in Herb. Hance, 6502 ! Herb. Kew.

Shinking : Sungari River and at Kirin, H.E.M. James ! Herb. Kew.

W. China : altitude 1950 m. Wilson, 3428 ! Herb. Kew.

Sect. 5. BRACHYCEPHALAE, N. D. Simpson.

Plantae herbaceae, caulibus elongatis. *Pedunculi* axillares, mox folia multo excedentes. *Bracteolae* duae. *Calyx* campanulatus dentibus subulatis. *Flores* umbellati, vexillo non producto, sine ungue vero, alis interdum bi-auriculatis. *Legumina* bilocularia, recta, sessilia.

63. **Astragalus bhotanensis,** Baker in Hook. fil. Fl. Brit. Ind. ii, 126 (1876).

A. brachycephalus, Franch. Pl. Delav. 161 (1890) ; Forbes et Hemsl. in Journ. Linn. Soc. xxxvi, 459 (1904).

Yunnan : Tapin-tze, Delavay, 567 ! North of Yun-nan-fu, 2100–2400 m., Forrest, 1127 ! Yun-nan-sen, Maire, 206 !, 1435 !, 2168 !, 2643 ! Herb. Kew. et Edin.

Sect. 6. TRACHYCERCIS, Bge.

Herbae humiles, caulibus brevissimis basi lignescentibus. *Flores* brevissime pedunculati ; bracteolae nullae. *Calyx* tubulosus, albo-pilosus. *Alarum* carinaeque ungues a vagina filamentorum liberae.

64. **Astragalus Giraldianus,** Ulbrich in Engl. Jahrb. Beibl. 82, 64 (1905) ; Dunn in Journ. Linn. Soc. xxxix, 421 (1911).

Shensi : In-fan-to, Giraldi, 4277 ! Herb. Berol.

65. **Astragalus scaberrimus,** Bge. Enum. Pl. Chin. Bor. 17 (1834) ; Bge. Astrag. Sp. Geront. ii, 197 (1869) ; Franch. Pl. David. i, 88 (1884) ; Forbes et Hemsl. in Journ. Linn. Soc. xxiii, 166 (1887).

A. Harmsii, Ulbrich in Engl. Jahrb. xxxvi, Beibl. 82, 63 (1905) ; Dunn in Journ. Linn. Soc. xxxix, 421 (1911).

Shensi : Ki-fou-shan, Giraldi, 4236 ! Lian-shan, Giraldi, 4235 ! Herb. Berol. (type of *A. Harmsii*).

Chihli : Peking, Bretschneider ! ; Carles ! ; A. K. Schindler, 100 ! ; Hemeling ! Hei-lung-tan, Hancock, 11 ! Chieh-tai-ssu, A. K. Schindler, 19 ! Herb. Kew. et Edin. et Berol.

Shantung : Ching-chou-fu, Couling, 107 ! Herb. Edin.

N. China : Tatarinow ! Herb. Kew.

China : (no definite locality) Bunge ! Herb. Kew. et Edin.

Sect. 7. XIPHIDIUM, Bge.

Herbae caulibus erectis altius lignescentibus, pedunculis axillaribus folia multo excedentibus.

Stipulae a petiolis liberae ; bracteolae nullae. *Calyx* tubulosus.

66. **Astragalus kifonsanicus,** Ulbrich in Engl. Jahrb. xxxvi, Beibl. 82, 64 (1905); Dunn in Journ. Linn. Soc. xxxix, 421 (1911).

Shensi: Ki-fou-san, Giraldi, 706!, 4240!, 4243!. Herb. Berol.

C. SPECIES EXCLUSAE.

Astragalus alaschanus, Bge., et **A. discolor,** Bge.

Dunn in Journ. Linn. Soc. xxxix, 421 (1911) includes these species in the list of Chinese plants. They were collected in 1873 by Przevalski, and, according to a map of Bretschneider, his route runs along the base of the Alaschan Mountains, and does not enter China.

Astragalus Laxmanni, Jacq.

Forbes and Hemsley include this species in the Index Florae Sinensis, i; it was, however, collected at Hami in Mongolia.

Astragalus coelestis, Diels! = *Gueldenstaedtia coelestis,* N. D. Simpson, comb. nov.

Astragalus Loczii, Kanitz, var. **scaposa,** Kanitz! = *Oxytropis Kanitzii,* N. D. Simpson, comb. nov.

D. BIBLIOGRAPHY.

The following is a list of the books and papers, in their chronological order, which have been quoted in the enumeration. The full reference is here given of those which have been quoted in brief in the foregoing part of the paper.

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1891. Kanitz, Plantarum in expeditione speculatoria comitis Béla Széchenyi a Ludovico de Loczi in Asia Centrali collectarum enumeratio.

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Contributions to the Knowledge of the Asiatic Polypodiums, with special reference to the Chinese Species.

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In order to make my position quite clear, a few explanatory words at the beginning of the paper will perhaps not be out of place. While examining some Japanese Ferns at Kew, it was found necessary to compare them with certain Chinese species. Thus a good opportunity was afforded to the writer of studying a large number of Chinese Ferns which are not known from Japan. Carrying the investigation still further, and with a view to arrive at a definite conclusion, it was thought advisable for the writer to extend his investigation to East India and to some other parts of Asia. Accordingly, a vast number of specimens from different parts of Asia, and also, in certain cases, from extra-Asiatic regions, has been examined. In the present study, however, the writer has confined himself to the subgenus *Pleopeltis* (*in sensu* Christensen).

Attention has been directed particularly towards the Chinese species, this being the original intention of the paper. Several botanists have recently studied Chinese Ferns; especially Dr. H. Christ and Mr. J. G. Baker, F.R.S., have made valuable contributions in various papers, and Fleet-Surgeon C. G. Matthew, R.N., has laboriously indexed all the Ferns known from China up to 1910.*

Now, the species of *Pleopeltis* occurring in temperate and subtropical Asia amount, according to Christensen's useful Index, to about seventy in number. Of these the writer has taken the liberty of examining particularly those that required a careful revision. As a result of the investigation, it has been found that a considerable reform in nomenclature as well as in conception of certain species is unavoidable.

It is surprising and much to be regretted that many a species has received more than one name either from different botanists or from the same authors. Consequently, about one-third of the known species have been either reduced as varieties or entirely suppressed. On the other hand, a few species which have long been regarded as synonyms have been revived.

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* Journ. Linn. Soc. xxxix (1911).

As to the classification, there have been put forward divergent views by different pteridologists. In recent years there seems to be a tendency to hold a wider view than was the case forty or fifty years ago. While Hooker and Baker regard *Pleopeltis* as a synonym of *Phymatodes* and consider it as a section of the genus *Polypodium*, Beddome retains it as a distinct genus. In the more recent classifications, such as of Diels and of Christensen, it is also treated as a subgenus of *Polypodium* ; and this appears to be in accordance with the modern conceptions of systematic botany. As to the subdivision of *Pleopeltis*, Diels' system is apparently very convenient. However, if the actual plants are studied, his system at once proves to be exceedingly unnatural. Thus if such a species as *Polypodium hastatum* is considered, one and the same species would fall into two distinct sections, or again if it is placed in his § *Pinnatifidae*, it would still be widely separated from the closely allied *P. Engleri* or *P. Griffithianum*. Moore's system seems to me far better in this respect. Yet, as he laid too much stress on the venation, *P. rhynchophyllum* and *P. Griffithianum* have been placed in § *Phymatodes* instead of § *Phlebodiopsis*. J. Smith has amended this defect in establishing a genus *Phymatopsis*, but his separating certain allied species under the generic names of *Anapeltis* and *Lopholepis* does not seem to be justifiable. Christ mentions in his Farnkräuter a few species of this group. He, however, places them under the subgenus *Craspedaria*, which he characterises by the dimorphic fronds and by the nervation between *Goniophlebium* and *Pleopeltis*. The study of the nervation of ferns is very interesting and necessary. However, one has to be cautious not to be carried away too far by the notion that the nervation is of fundamental importance and the only way of classification. As a matter of fact, the nervation is liable to variation even within one species. *P. rhynchophyllum* would furnish a good example of modification of the venation from a comparatively simple and regular type to a more irregular and in some degree more complicated. In this way the type of the venation found in this species passes to that of another species and is finally connected, through several species, with the much more compound, different-looking venation of *P. venosum*. If, however, actual plants are examined, it would be quite clear how *P. rhynchophyllum*, *P. accedens*, *P. lycopodioides*, *P. salicifolium*, *P. drymoglossoides*, *P. soridens*, *P. oodes*, *P. simplicissimum*, *P. pilosellum*, *P. squamulosum*, *P. vacciniifolium*, *P. stenophyllum*, etc., are closely allied to each other, and how these are quite naturally connected with *P. Griffithianum* and *P. trifidum* through *P. hastatum*. Yet these members of one natural group have been classed in several different sections of a certain subgenus, or even into different subgenera, on account of different nervations. It is impossible to understand why different types of nervation should not occur within one group of ferns. It is almost absurd to establish genera on a slight difference in nervation alone. The case above mentioned is only an instance to show how natural groups of ferns have been unnaturally systematised. It is much to be desired that a more natural classification of ferns based upon sound judgment and careful observations on actual plants in nature should be undertaken.

As to the distinction of species, the writer is of opinion that the ramenta on the rhizome generally afford a good distinguishing character, though their colour may vary to a certain extent. However, it should be remembered that in some cases, such as in *Phymatopsis*, closely related species possess ramenta of very slight difference. The position of sori, as to whether they are marginal or intramarginal, etc., seems to be subject to little variation, and particularly in *Eupleopeltis* one can usually rely upon it. In the pinnate forms, the direction of pinnae, especially of the lowermost pair, can be commonly taken into consideration. The margin of the frond, whether entire, notched, or toothed, etc., is not to be neglected in many cases. Lastly, I may mention that the consistency of the frond can also frequently be utilised. However, one has to be very careful in regard to the age of the frond and also to the circumstances of the habitat, whether sunny or shaded ; young fronds of thick-leaved species have repeatedly been described by herbarium-botanists as "membranaceous."

The present investigation has been carried out in the Kew Herbarium, while a few specimens in the British Museum have also been examined. The writer wishes to take this opportunity of thanking the authorities of both establishments for their courtesy in allowing him to use the herbarium and library.

1. **P. lineare**, Thunberg.

Owing to its wide distribution over various parts of the Old World and to its polymorphic nature, this species has several varieties, the majority of which have been described as distinct species. Although the different varieties are connected with each other by intermediate forms, they are fairly well fixed, so that their extreme forms really appear, in some cases, as if distinct species. There is, consequently, a great difference of opinion amongst botanists as to the specific limit of *P. lineare*. In addition to the fact just mentioned, this species has, from time to time, been confounded with other species of a similar appearance, especially with *P. nudum* and *vice versa*. The confusion in nomenclature of the species belonging to this group has been further accentuated by the fact that different authors, and in some cases even the same botanists, have described the same species under several specific names, whilst several species of the group have been incorrectly reduced by others.

The *modus operandi* of botanists dealing with the plants of this group is either to include all the species under the all-embracing *P. lineare*, or to regard each form as a distinct species. The latter method more clearly shows, in a flora or a work of similar nature, which species or forms occur in certain districts, and is more valuable than the other, which gives us only a vague idea of the geographical distribution of this group of ferns. The practice of disregarding subordinate forms, which is usually adopted, having been handed down to us from the past, does not carry one far, and is in every respect at variance with the modern conceptions of systematic and geographical botany.

It is, however, by no means an easy task to clear up all the misconceptions and confusions in connexion with *P. lineare*, and to arrange the members of this group. As I have been in the fortunate position of examining the type or co-type specimens of most of the plants referred to *P. lineare* by different botanists, together with several others described as varieties of or closely allied to *P. lineare*, I propose to systematise all the varieties and forms of *P. lineare* known to me, and to make some remarks upon each one of them, together with the allied species.

Polypodium lineare, Thunb. amplif.

α. **Thunbergianum,** (Kaulf.) Takeda.

Syn. :—*P. lineare*, Thunb. Fl. Japon. p. 335 (1784); Makino, Phan. et Pter. Japon. Ic. Illus. sub tab. ix (1899).

Pleopeltis Thunbergiana, Kaulf. Wesen d. Farrnkr., p. 113 (1827).

Pl. elongata, Kaulf. Enum. Fil. p. 246 (1824).

P. atropunctatum, Gaudich. Freyc. Voy. Bot. p. 346 (1828); Mett. Polyp. n. 160 (1857); Hook. et Arn. Bot. Beechey's Voy. p. 103 (1832).

P. lineare a typicum Makino, in Tôkyô Bot. Mag. xv, p. 61 (1901).

Frondes plerumque subcaespitosae vel sparsae, 10–30 cm.

vulgo 15 cm. lg., 5–11 mm. vulgo 8 mm. lt., coriaceae, rigidae, supra atropunctatae, apice longe acuminatae, basin versus in stipitem brevissimum vel breve sensim attenuatae, margine in sicco saepius revolutae. Sori rotundi vel ovales, adproximati, et adulti saepe subconfluentes, supremam frondis partem (saepius apice excepto) occupantes, medii inter costam et marginem. Rhizoma paleis nigris, clathratis, e basi cordato-ovata longissime acuminatis, margine ciliato-dentatis vestitum.

Distr.—Japonia media et australis, Formosa, Corea, China, Tibet, Ins. Hawaii, et Java.

This is the form which was first described in 1784 by Thunberg from Japan as *Polypodium lineare* and later by Kaulfuss from Owahu under the name of *Pleopeltis elongata*.* Kaulfuss, probably unaware of the identification of Thunberg's plant with his species, and in order to distinguish it from his *Pleopeltis linearis* * (=*P. lanceolatum*, L.=*Pl. lanceolata*, Kaulf.), proposed, in 1827, to call it *Pl. Thunbergiana*.† The same form again received a fourth name, *P. atropunctatum*, Gaud., which was given to an Hawaian specimen, and in recent years it has been distinguished by Makino as *P. lineare α. typicum*.

The frond is thick and persistent, and the colour is a deep green on the upper surface, and paler on the under side. In the dry season the fronds curl up, and unroll again in damp weather. This form is very common in Japan, and is found growing on trunks or rocks, and sometimes also on old thatched roofs.

Outside Japan, Formosa, and the Sandwich Islands, I have seen the following specimens :—

COREA. Quelpaert (Taquet, n. 3656).

CHINA. Kwantung: Lo Fou Shan (ex hb. bot. Hongk., n. 140) ; Fukien : Amoy (Hance, n. 1410. Swinhoe, 1870) ; Chekiang : in ins. parva Toon doon ding san lacus Taihu (Forbes, n. 1874) ; Kiangsi : Kiukiang (Forbes, n. 541 ; Shearer, 1873) ; Szechwan : Mt. Omei (Faber, n. 1069) ; Yunnan : Mao-kon-tchang (Delavay, 1883) ; Szemao (Henry, n. 10,062), Mengtsz (Henry, n. 10,087A).

TIBET. Yatung, 27° 51′ N., 88° 35′ E. (H. E. Hobson, 1897).

JAVA. No precise locality (J. H. Walker, 1876).

Forma **caudato-attenuatum,** Takeda.

Frondes apice longissime caudato-attenuatae saepe elongatae, 20–30 cm. lg., ceterum uti in typo.

JAPAN. Yokosuka (Savatier, n. 1541, part.) ; Ôshima (C. Wright, 1853–56, ex hb. U.S. Pacif. Expl. Exped.).

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* Kaulf. Enum. Fil. p. 246 (1824).

† Kaulfus (Das Wesen der Farrnkräuter, p. 115 [1827]) regards *Pl. nuda*, Hook. (1823), as a synonym of *Pl. elongata*, Klf. (1824). Besides this case, he disregards older names and prefers using new names of his own.

China. Yunnan: Szemao, N.W. mts., 5000 ft. (Henry, n. 10,062a).

25071 Forma **contortum,** (Christ) Takeda.

Syn.:—*P. lineare* var. *contortum,* Christ, in Nuovo Giorn. Bot. Ital. n. ser. iv, p. 98, tab. i, fig. 3, 3, 3, 3 (1897); Makino, Phan. Pter. Japon. Icon. Ill. ii, tab. xcviii–c. (1903).

P. contortum, Chr. in sched.

Quoad staturam ut in *α*, sed frondibus plerumque sparsis, saepe tenuioribus, distincte et breviter stipitatis, in sicco admodum revolutis et irregulariter contortis.

A form, when dry, becoming extraordinarily contorted, otherwise same as *α*. Christ is inclined to separate this form as a distinct species on account of the contorted condition and the cuspidate apex of the frond. He places the present plant between the type form of *P. lineare* and *P. Lewisii,* but what he takes for *P. Lewisii* Bak. is, in fact, *P. involutum* Bak. As I have pointed out above, the typical form of *P. lineare,* and also its varr. *ussuriense* and *loriforme* (*v. infra*), as well as *P. nudum* and other persistent species, roll up their fronds when the atmosphere becomes very dry. If specimens are collected and pressed in this condition, they all will appear exactly like Christ's *contortum.* The only difference of the *contortum* from other forms of *P. lineare* is, so far as I can decide from the herbarium material, that the frond is thinner in texture, more or less scattered on the rhizome, distinctly stipitate, and shows a stronger tendency to roll up than the others. It would be more natural to regard this plant as a mere form of *P. lineare α*.

Japan. Yokosuka (Savatier, n. 1541, part.).

China. Shensi: Zulu Mts. (Giraldi, 1894); Kuan-tou-san (Giraldi, 1896).

Sandwich Isl. Oahu (Beechey; D. Nelson; Menzies).

β. **subspathulatum,** (Hook.) Takeda.

Syn.:—*Drynaria subspathulata,* Hook. Kew Journ. Bot. ix, p. 356 (1857).

P. Onoei, Fr. et Sav. Enum. Pl. Japon. ii, pp. 246, 644 (1879).

P. lineare var. *Onoei* Makino, in Tôkyô Bot. Mag. xi, p. 282 (1897); Ej. Phan. Pter. Japon. Ic. Ill. i, sub tab. x (1899).

P. lineare var. *abbreviatum,* Christ, in Bull. Acad. Intern. 244
Geogr. Bot. xi, p. 208 (1902).

P. Wightianum, Benth. Fl. Hongk. p. 458, part. (1861).

Frondes vulgo sparsae, 2–7 cm. lg., 2·5–5 mm. lt., subcoriaceae vel coriaceae, apice rotundatae vel anguste obtusae, basi breviter in stipitem brevissimum attenuatae, margine saepissime revolutae. Sori in parte frondis apicali continentes. Paleae rhizomatis ut in *α*, sed plerumque breviores.

Distr.—Japonia, Corea, et China.

This variety is characterised by the small frond with roundish apex. It is sometimes difficult to distinguish it from a dwarf form of *α*. This plant was described from Japan by Franchet and Savatier as *P. Onoei*, and has been rightly reduced by Makino to *P. lineare* as a variety.

This variety had not been recorded from China until 1902, when Christ described it as *P. lineare* var. *abbreviatum*. There are at Kew and in the British Museum specimens of the identical plant collected by Harland in Hongkong, and labelled *Drynaria subspathulata*, Hook. Although these particular specimens did not form the basis of Hooker's description, they agree very well with the diagnosis. Harland's specimens are referred to by Bentham in his Flora Hongkongensis, but this author, instead of using Hooker's name, regards it as a synonym of *Polypodium Wightianum*, Wall. His description given for *P. Wightianum* in his book is, however, partly of *P. Wightianum*, Wall. (=*P. nudum*, Kze.) and partly of our plant.

From China I have seen the following specimens :—

Hongkong (Harland, 1857) ; Chekiang : hill west of Huchow (Carles, n. 188) ; Kiangsu : Shanghai (Maingay, n. 452).

γ. **ussuriense,** (Rgl. et Maack) C. Christ. Ind. Fil. p. 572 (1906) ; *id.* in Bull. Acad. Intern. Geogr. Bot. xxi, p. 71 (1911).

Syn. :—*Pleopeltis ussuriensis* Rgl. et Maack, Tentam. Fl. Ussur. p. 175 (1861).

P. ussuriense, Rgl. in Acta Hort. Petr. vii, p. 663 (1881).

P. leiopteris, Makino in Tôkyô Bot. Mag. xii, p. 88 (1898), non Kze.

P. sesquipedale forma *leiopteris,* Makino, Phan. Pter. Japon. Ic. Ill. sub tab. viii, excl. syn. (1899).

P. lineare var. *distans,* Makino, in Tôkyô Bot. Mag. xv, p. 60 (1901).

P. distans, Makino, l.c. xx, p. 33 (1906).

P. annuifrons var. *distans,* Nakai, Fl. Kor. ii, p. 44 (1911).

P. lineare var. *coraiense,* Christ, in Fedde, Repert. v, p. 10 (1908).

P. coraiense, Christ, l.c. p. 285 (1908).

P. Schraderi, Milde, Fil. Eur. Atl. etc. p. 16, part. (1867).

Frondes plerumque distantes, sed raro caespitosae, vulgo distincte stipitatae, stipite 5–30 mm. lg., raro nullo, 7–20 cm. lg. cum stipite, 5–10 mm. lt., subcoriaceae, tenues, apicem versus sensim attenuatae, acutae, margine minus revolutae. Sori parvi (diam. infra 3 mm.), saepe in parte apicali et ultra medium frondis occurrunt, adproximati, sed vix confluentes. Rhizoma gracile, paleis ovatis, acuminatis, distincte reticulatis, parce ciliato-denticulatis tenuiter obtectum.

Distr.—Japonia occidentalis et borealis (ubi rarior), Corea, et Manchuria.

This variety is fairly invariable, and is distinguished from the others by the fronds of thinner texture, distantly arranged on the rhizome, and generally stalked, as well as by the sori and the ramenta on the rhizome smaller than in the others. The margin of the frond does not roll up very strongly, but I have seen a specimen collected by Ross in Manchuria, which at first glance appears as if it were *a Thunbergianum* forma *contortum*.

I have examined the following specimens from Manchuria :—

Fenghwangcheng, shady rocks (Ross, Apr. 1876) ; Lao yeh Ling, near Moukden (James, 1886) ; Changpaishang (do.) ; Tang-ho-ko, Sungari R. to Hui Fa R. (do.).

δ. **loriforme,** (Wall.) Takeda.

Syn. :—*P. loriforme*, Wall. List, n. 271 (1828) ; Mett. Polyp. p. 92 (1857) ; Hooker, Gard. Ferns, sub tab. 14, excl. syn. (1862).

P. excavatum var. *loriforme*, C. Christ. Ind. Fil. p. 541 (1906).

Luxurians. Frondes saepe subcaespitosae, ultra 30 cm. vulgo 20 cm. lg., 2 cm. lt., coriaceae, anguste oblanceolatae, longe acuminatae, basin versus in stipitem breve sensim attenuatae, costa prominenti, in sicco plerumque longitudinaliter tenuiter rugosae. Sori partem frondis apicalem occupant et saepe ultra medium occurrunt, distantes, inter costam et marginem medii vel leviter ad marginem dispositi ; in sicco frondis margo revoluta, atque sori marginales videntur. Rhizoma crassum, paleis ovatis longissime acuminatis, ciliato-dentatis, nigro-clathratis, patentibus dense vestitum.

Distr.—India, China, et Ins. Hawaii.

This is a very luxuriant form, and is easily distinguished by the thick texture and the peculiar longitudinal wrinkles, which are more prominent than in the others. In dried specimens the margin of the frond rolls up as far as the line of the sori, so that the sori appear as if marginal. The sori are large and not very close together as in *a*, but sometimes some of them become confluent.

In the Wallichian Herbarium there are specimens of *P. loriforme* (n. 271) from two localities. Those from Nepal (1823) are fine representatives of our plant, reaching over a foot in length, while those from Ladakh, collected by Moorcroft (1822) and named *P. loriforme* by Wallich himself, are, however, not the real *P. loriforme*. The Ladakh specimens are 5–7.5 cm. in length, and possess the sori nearer the midrib than the margin.

As far as the writer can judge from the insufficient material, they belong to *P. nudum*.

Christensen considers that the *P. loriforme* figured and described by Hooker in Garden Ferns, tab. 14, differs from Wallich's plant. Though the sori are delineated too near to the midrib, it undoubtedly represents Wallich's *loriforme*. Hooker is, however, not correct in referring certain specimens of *P. nudum* and *P. lineare α* to this figure, and in giving *Pl. nuda*, Hook., *P. Wightianum*, Wall., and *P. gladiatum*, Wall. for synonyms.

This variety occurs abundantly in India,* whilst it is rarely found in China. I have seen one or two specimens of *P. lineare* from the Sandwich Islands, collected by Beechey, which possibly represent the *loriforme*. From China the following specimens have come under my observation :—

Yunnan : without precise locality (Henry, n. 9194, part.) ; Yunchang (Henry, n. 13,339) ; Mengtsz (Hancock, 1894) ; Szechwan : Mt. Omei (Wilson, n. 5318).

Forma **steniste**, (Clarke) Takeda.

Syn. :—*P. lineare* var. *steniste*, Clarke Ferns of Northern India, p. 559 (1880) ; Bedd. Handb. Ferns Br. Ind. p. 347 (1883).

Differt tantum frondibus angustissimis, 6–9 mm. lt., in sicco margine revolutis, atque frondes latitudine 5 mm. non excedere videntur.

Only a narrow-leaved form of the var. *loriforme*. It is known from Sikkim, Assam, and Khasia.

ε. **elongatum**, (Schrad.) Takeda.

Syn. :—*P. elongatum*, Schrad. in Gött. gel. Anz. (1818), p. 915 ; Schltd. Adumbr. Pl. p. 16, tab. vii (1825).

P. Gueintzii, Mett. Polyp. p. 91, tab. iii, fig. 18, 19 (1857).

P. Schraderi, Mett. ibid. p. 98, tab. ii, fig. 11 ; Hook. and Bak. Synop. Fil. p. 354 (1874) ; Milde, Fl. Eur. Atl. etc. p. 16, part. (1867).

P. lineare et var. *Schraderi*, Sim, Ferns of S. Africa, pp. 197, 199, tab. cxiv, cxv (1892).

Frondes subcoriaceae vel coriaceae, plerumque oblanceolatae, 10–30 cm. vulgo 20 cm. lg., 12–26 mm. lt., stipitatae, stipite 12–25 mm. lg. Sori in parte superiore frondis occurrunt, magni, adproximati. Palea rhizomatis ut in δ.

Distr.—Africa australis et orientalis, et Ins. Madagascar.

This is a broad-leaved variety, and is the sole representative of this species in Africa. The specimens collected by A. A.

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* Nepal, Sikkim, Assam, Khasia, and Bhotan.

Heller in the Sandwich Islands (n. 2533) may possibly be referred to this variety.

It is highly interesting to find this Asiatic species in Madagascar and other parts of Africa. Similar geographical distribution is also shown by certain other species of this genus.

I have examined the following specimens of this variety :—

S. Africa. Natal (M'Ken, n. 23, 174; M'Ken and Buchanan, n. 66, 67; W. T. Gerrard, n. 504); near King Williamstown (Sim, n. 1588, 1589); British Kaffraria (T. Cooper, n. 386; D'Urban; R. Baur, n. 2, 942); Transvaal/Natal (Van Reenen; R. Schlechter, n. 6914); Orange Free State (T. Cooper, n. 1202); East Griqualand: Mt. Zuurberg (W. Tyson, n. 1779); Cape Colony (R. Schlechter, n. 1); Cape of Good Hope (T. Cooper, n. 958).

E. Africa. Ruwenzori: Mau Forest (Scott-Elliot, n. 9198).

Madagascar. Tanala (Kitching, 1880); Antananarivo (Pool, 1876).

Besides those varieties mentioned above, there have been described two others, namely var. *glaucosorum*, Christ * and var. *caudatum*, Makino.† The writer has been unable to examine any authentic specimen of either of them. As far as can be made out from the descriptions, the former may belong to *P. excavatum*, while the latter represents *P. nudum*. At any rate, neither of these appears to the writer to be a variety of *P. lineare*.

2. **P. eilophyllum,** Diels.

This species is closely allied to the preceding; it differs, however, above all, in the sori being situated quite close to the midrib and oblong in shape.

Christ has mistaken this species for *P. Lewisii*, Bak., and has given a description and figures in the Nuovo Giornale Botanico Italiano, n. ser. vol. iv, 1897, under the latter name. He also considers the present species to be an extreme form of *P. lineare*,‡ an opinion not to be approved.

This plant was first described as *P. involutum*, Bak.,§ and, as the same name had been used already, has been altered by Diels to *P. eilophyllum*.‖ I have seen the following specimens :—

Hupeh: without precise locality (Henry, n. 6859); Shensi: Mt. Thae-pei-san (Giraldi, Aug. 1876); Yunnan: Mengtsz, woods 6000 ft., on tree (Henry, n. 9249B).

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* Bull. Acad. Intern. Geogr. Bot. xi, p. 209 (1902).

† Tôkyô Bot. Mag. xvii, p. 78 (1903).

‡ Farnkräuter der Erde, p. 102 (1897), under *P. lineare*, as *P. Lewisii.*

§ Journ. Bot. xviii, p. 177 (1889).

‖ Engl. Bot. Jahrb. xxix, p. 204 (1900).

3. **P. Lewisii,** Baker.

This is a very small fern measuring about 4–10 cm. in length. It is undoubtedly related to the preceding species; it differs, however, in the main, by the margin of the frond being strongly revolute, so that it completely conceals the sori, while in the other plant the sori are, at all events, quite visible.

This seems to me a rare species, having been found by Dr. Shearer in Kiukiang, Kiangsi, in 1873, and described by Mr. Baker in 1875; * it has not been collected since.

4. **P. oblongisorum,** Christensen.

When describing this species under the name of *P. subintegrum*, Baker,† the author states that his plant comes very close to *P. soridens*, Hook. He seems to have noticed only the position of the sori, which, in the mature condition, appear to project beyond the margin of the frond, in consequence of the free parts of the margin becoming strongly revolute. These two species are, however, not closely related at all, since *P. soridens* belongs to J. Smith's *Phymatopsis*, while Baker's plant is a *Eupleopeltis*. As a matter of fact, *P. oblongisorum*, C. Chr. is allied to *P. eilophyllum*, Diels, from which it can easily be distinguished by the narrower and less revolute frond and the marginal sori.

Only the type specimen from Yunnan (Henry, n. 9194, part.) has been examined.

The name has been altered to *P. oblongisorum*, C. Chr.,‡ because *subintegrum* has been occupied by another plant.

5. **P. subimmersum,** Baker.

This species somewhat resembles *P. lineare* var. *loriforme*, Takeda, from which it differs in having the margin slightly sinuate, with a sinus near each sorus.

This fern from China was first described by Mr. Baker in 1895 under the name of *P. subimmersum*. In 1906 the same author gave a second name, *P. xiphiopteris*, to an identical form, and another name, *P. mengtzeanum*, to a broad-leaved form of the same species.

In regard to the width, the frond is liable to variation. While the usual breadth of the fronds is 10–15 mm., there sometimes occurs a frond not exceeding 8 mm. or even less broad. The plant described as *P. mengtzeanum* possesses an exceptionally broad frond attaining 2 cm. in width.

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* Journ. Bot. iv, p. 201.

† Kew Bull. (1898), p. 231.

‡ Ind. Filicum (1906).

A careful examination of the type specimens of the above-mentioned three recognised species has led the writer to arrange them as under :—

P. subimmersum, Baker, in Kew Bull. (1895), p. 55.
Syn. :—*P. xiphiopteris,* Bak. l.c. (1906), p. 13.
Yunnan : Mengtsz (Hancock, n. 92, Henry, n. 11,826, 11,826A).

Forma **angustifrons,** *mihi.*
Frondes latitudine 8 mm. non excedentes, saepe angustiores.
Yunnan : Yungchang (Henry, n. 13,425).

Forma **mengtzeanum,** (Bak.) *mihi.*
Syn. :— *P. mengtzeanum,* Bak. l.c. (1906), p. 14.
Yunnan : Mengtsz (Henry, n. 11,827B).

The name *subimmersum* is rather inappropriate, since the sori are superficial.

6. **P. sublineare,** Baker, in sched. sp. nov.

P. oligolepido, Baker affine, sed frondibus subfasciculatis nec distantibus, sessilibus nec stipitatis, ramentis longe acuminatis, clathratis, ciliato-dentatis, nec integris, fusco-brunneis differt.

Rhizoma crassum, ramentis oblongo-ovatis, longissime acuminatis, clathratis, ciliato-dentatis obtectum. Frondes subfasciculatae, 12–42 cm. vulgo circa 30 cm. lg., 2–5 cm. vulgo 3 cm. lt., lanceolatae, apice longe acuminatae, basin versus longe decurrentes, subcoriaceae, nervis inconspicuis, utrimque glabrae, pagina superiore minutissime copioseque nigropunctata, margine plus minus repandae, costa prominenti. Sori plerumque inter costam et marginem medii, rotundi, globosi, 2–3 mm. diam., superficiales, juveniles paleis peltatis tecti.

CHINA. Yunnan : Tengchwan Lin Mt. forest, 9000 ft. (Henry, n. 9062A) ; Mengtsz, E. mts., 6000 ft. (Henry, n. 11,827, 11,828) ; Yungchang, 6000 ft. (Henry, n. 13,603).

Henry's no. 9062A has been determined and reported by Christ as *P. simplex.** However, the locality given by that botanist is not identical with that of our plant, so that the writer presumes that there may have been some error in connexion with his specimen.

7. **P. oligolepidum,** Baker.

Rhizoma crassum, 2–3 mm. diam. fusco-nigrum, paleis deltoideis, anguste acuminatis, integris, dorso nigro-brunneis et reticulatis, margine late hyalinis vestitum. Frondes distantes, distincte stipitatae, stipite 2 ad 4 cm. lg., crasso, levi, nigricanti, lamina 10–23 cm. lg., 1–2 cm. lt., lanceolata, apice anguste acuminata, subcoriacea, costa prominenti, nigrescenti, nervis inconspicuis, pagina superiore nigro-punctata, pagina inferiore paleis minutis cuspidato-ovatis nigris parce vestita. Sori inter costam et marginem medii, globosi 3–4 mm. diam., superficiales, in parte superiore frondis vel saepe ultra medium occurrunt.

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* Bull. Herb. Boiss. vi, p. 875 (1895).

This is perhaps a rare species, or has been confounded with some other species of the *P. lineare* group. It was first described by Mr. Baker in the Gardeners' Chronicle, n. ser. xiv, p. 494 (1880), from two imperfect, unusually small fronds. In 1905 Christ reduced this species to *P. lineare* as a variety,* but, as I have not seen the specimens referred to, I am not quite certain if his name can be regarded as a synonym of our plant.†

This species is characterised by the thick, almost black stipe, lanceolate frond, and large globose sori arranged in a row between the midrib and the margin, or slightly nearer the midrib.

I have seen the following specimens :—

Kwantung: Lo Fou Shan, alt. 3100 ft. (ex hb. Hongk., n. 13); Kiangsi: Kiukiang (Maries); Yunnan: Mengtsz, mt. woods to S.E., 6000 ft. (Henry, n. 10,192).

The last-referred specimen has been determined by Christ as *P. simplex*.‡

8. **P. nudum**, Kunze.

For nearly a century *P. nudum* has been confused with *P. lineare*, and sometimes with *P. excavatum*. Hooker's first description, accompanied by a beautiful plate, of this plant under the name of *Pleopeltis nuda* was published in the Exotic Flora, tab. 63, 1823. Kaulfuss may have been the first to reduce this name § to his *Pl. elongata*, which was published in 1824. Later, Hooker himself confused his plant with others. In Garden Ferns ‖ and in Species Filicum he uses the name *P. loriforme*, Wall. (=*P. lineare* var. *loriforme*, Takeda) for the present plant, and gives for synonyms, amongst others, *Pl. nuda*, Hook., *Pl. elongata*, Kauff., *P. lineare*, Thunb., *P. Gueintzii*, Mett., *P. excavatum*, Willd., and *P. phlebodes*, Kze.¶ Thus he evidently held a very wide view, which has given rise to much confusion in later years.

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* Soc. Bot. France, Mém. i, p. 15 (1905).

† The specimen collected by Giraldi in Thae-pei-san in Aug. 1895, and determined by Christ as *P. oligolepidum* (Nuov. Giorn. Bot. Ital. n. ser. iv, p. 99 [1897]) is not Baker's plant, but *P. clathratum*, C. B. Clarke. See also under *P. excavatum*.

‡ Bull. Herb. Boiss. vi, p. 875 (1895).

§ Das Wesen der Farrnkräuter, p. 115 (1827).

‖ Gard. Ferns, sub tab. 14 (1862).

¶ Species Fil. v, p. 57 (1864).

P. nudum has received more names from Wallich, namely *P. gladiatum* and *P. Wightianum*. An examination of the Wallichian Herbarium, now in possession of Kew, together with other specimens distributed by Wallich, has convinced the writer that *P. Wightianum* is exactly identical with the typical *P. nudum*, while the other name was given to a narrow-leaved form of the same species.

In addition to this complication in nomenclature, Kunze described in 1850 *P. nudum* under the name of *P. leiopteris*.* This name was accepted by Mettenius in 1856,† but in the following year was reduced to *P. sesquipedale*, Wall.‡

In 1851, Kunze published another new species called *P. nudiusculum*.§ According to the author, this fern is closely allied to *P. nudum*, while Christensen ‖ tells us that it is partly *P. lineare* and partly *P. simplex*. As far as the writer has been able to make out from the original description, *P. nudiusculum*, Kze. seems to be conspecific with *P. nudum*, as several other botanists consider.

The confusion of *P. nudum* with *P. excavatum* may be excusable, but how this species has been confounded with *P. lineare*, *P. loriforme*, or *P. Gueintzii* is almost inconceivable. *P. nudum* can easily be distinguished from any form of *P. lineare* by the ramenta on the rhizome being ovate, acuminate, entire, and brownish in colour, while the ramenta of *P. lineare* are subulate, long-acuminate, ciliate-dentate, and black in colour. The second point of distinction is that the sori of *P. nudum* are situated close to the midrib and usually reach more than half way down the frond, whereas those of *P. lineare* are generally between the midrib and the margin or slightly nearer the margin, and extend but seldom to the base of the frond. The texture of the frond varies to some extent; it is usually subcoriaceous and thinner than in *P. lineare*, or in some cases still thinner. However, the veins are always hidden, as in *P. lineare*. Since the frond persists through the winter, it rolls up in the dry weather, as may often be seen in the herbarium specimens in the margin being revolute. When a specimen is collected in the dry season and pressed as it is, the plant assumes the condition of *P. contortum*, Christ.

The dimension of the frond is extremely variable. In a small specimen the frond may be about 10 cm. long and 7–10 mm. wide. In a luxuriant form it may attain 40 cm. long and over 15 mm. wide. The form of the frond is generally linear, or sometimes linear lanceolate, and often tapering into a narrowly acuminate apex. The stipe also varies from half a centimetre up to 6 cm.

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* Linnaea, xxiii, p. 319 (1850).

† Fil. Hort. Lips. p. 36, tab. 25, fig. 37–39 (1856).

‡ Polypod. p. 91 (1857). Mettenius is certainly wrong in using Wallich's name for this plant. His description and the synonyms given apply to *P. nudum*, but not to *P. sesquipedale*, Wall.

§ Linnaea, xxiv, p. 253 (1851).

‖ Ind. Fil. p. 548 (1906).

As in *P. lineare* the frond forks two to several times. Such a monstrosity is not uncommon amongst ferns. Where it is fairly well fixed, it may be distinguished as monstr. *ramifrons*, otherwise it is not worth while to discriminate it as a special form.

This species is widely distributed in India, occurring in Punjab, Nepal, Kumaon, Sikkim, Khasia, Madras, Nilghiri (abundant), and in Ceylon. It is also distributed over Sumatra (Tuschemacher, n. 29, 30) and China. The only Chinese specimen I have examined was collected by Henry (n. 13,129) in Yunnan: "Szemao, N.W. mts., 6000 ft., on tree." It is quite unknown from Japan; any information as to its occurrence in Japan is due to the mistake of *P. lineare α Thunbergianum* for *P. nudum*.

The synonymy of our plant is as follows:—

P. nudum, Kze. in Linnaea, xxiii, p. 281 (1850).

Syn.:—*Pleopeltis nuda*, Hook. Exot. Fl. sub tab. 63 (1823).

P. gladiatum, Wall. List, n. 279 (1828).

P. Wightianum, Wall. List, n. 2222 (1829).

P. leiopteris, Kze. l.c. pp. 279, 319 (1850).

Drynaria Zeylanica, Fée, Gen. Fil. p. 272 (1850–52).

P. nudiusculum, Kze. l.c. xxiv, p. 253 (1851).

P. sesquipedale, Mett. Polyp. p. 91 (1857), nec Wall.

P. lineare, Blanf. in Journ. As. Soc. Bengal, lvii, p. 312, tab. xix (optim.).

P. lineare var. *Elysianum*, Blanf. Ann. List Ferns of Simla, p. 14 (no date).*

9. **P. excavatum,** Bory.

This species is so closely allied to the preceding that it has been sometimes confounded with it. It has also been confused with *P. lineare*, as has been pointed out by more modern workers.†

Like *P. lineare*, this fern has a wide range of distribution; consequently there have been proposed several names which will be enumerated below. Christensen regards some of the synonyms as varieties, but I cannot agree with him in this respect.

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* The type specimens from Simla have narrow fronds not exceeding 10 mm. or less and longly stalked. I do not deem it necessary to separate it as a form.

† Bedd. Handb. p. 347 (1883); Blanf. in Journ. As. Soc. Bengal. lvii, p. 313 (1888); Hope, in Journ. Bombay Nat. Hist. Soc. xv, p. 91 (1903).

As the characteristic features of this species we may mention that the frond is very thin, herbaceous, distinctly showing the veins and venules; the sori are arranged in a row quite close to the midrib and immersed, and the ramenta are ovate, acuminate, and entire. The sorus is, when young, completely covered with a number of large peltate scales, which are usually pale brown, or in the variety, dark in the centre.

P. excavatum can readily be distinguished from *P. nudum* by the very thin frond, which, being deciduous, does not roll up on the margin, and by the sori, which are situated nearer the midrib than in the other species, often larger, and obliquely oval in shape, while those of *P. nudum* are strictly round.

The ramenta on the rhizome vary in colour from pale brown to dark brown, or in the case of the variety, they are light brown in the margin, and black in the centre.

The synonymy of this species is as follows :—

P. excavatum, Bory, apud Willd. Sp. Pl. v, p. 158 (1810).

Syn. :—*P. simplex,* Sw. in Schrad. Journ. 1800, p. 158 (1810), non alior.; Blanf. in Journ. As. Soc. Bengal, lvii, p. 313, tab. xx (optim.)

P. lineare β simplex, Bak. in Hook. Bak. Syn. Fil. p. 345 (1883).

P. Scolopendrium, Ham. apud Don, Prodr. Fl. Nepal. p. 1 (1825).

P. sesquipedale, Wall. List, n. 275 (1828).

Drynaria phlebodes, Fée, Gen. Fil. p. 270 (1850–52).

P. phlebodes, Kze. apud Mett. Polyp. p. 92 (1857).

P. bullatum, Bak. in Journ. Linn. Soc. xv, p. 420 (1876).

P. lineare et forma *major* Christ, in Bull. Acad. Intern. Geogr. Bot. xvi, p. 105 (1906), non Thunb.

P. maculosum, Christ, l.c. nec Christ, 1898.

α. **concolor,** Takeda.

Ramenta rhizomatis concoloria fusca vel nigro-fusca, margine pallidiora.

β. **bicolor,** Takeda.

Ramenta laete brunnea et medio nigra.

Monstr. **polymorphum,** (Clarke) Takeda.

Syn. :—*P. lineare* var. *polymorphum,* Clarke, Ferns N. India, p. 559 (1880).

Distr. spec.—India (Punjab, Nepal, Kumaon, Sikkim, Assam, Khasia), Ceylon, China, Africa trop., Madagascar, Ins. Mascar.

As in *P. nudum*, the frond of this species is extremely variable in size. The smallest one examined does not exceed 10 cm. in length, while the largest one would reach 40 cm. The width also varies from less than a centimetre up to over 4 cm. It is almost impossible to distinguish different varieties or forms based on the dimensions of the frond. The ramenta in the var. *bicolor* give a peculiar appearance, somewhat resembling those in *P. sinuosum*. This variety is found in China, together with the typical form, and also occurs in India.* The following specimens from China have been examined :—

a. concolor :—

Yunnan : Szemao, W. mts., 6000 ft. in forests, on trees (Henry, n. 13,070A) ; Mengtsz, N. mts. forests, on tree, 8500 ft. (Henry, n. 10,087), on wind-blown rhododendron trunk at 6000 ft. (Hancock, n. 104). Tibet : Yatung (Hobson, 1897).

β. bicolor :—

W. China : without locality (Wilson, n. 5317, 5317A) ; Hupeh : Patung District (Henry, n. 1739, 2465) ; Yunnan : Mengtsz, N. mt. forests, 8500 ft., on tree (Henry, n. 10,088 †) ; Montagne de Mao ku chang (Delavay, Jul. 1883).

Any information as to the occurrence of this species in Japan does not apply to this fern, but to *P. annuifrons*, Makino.‡

10. **P. annuifrons,** Makino.§

Although this species has been taken for *P. excavatum*,‖ it is not closely akin to that plant. The frond is thin, chartaceo-coriaceous, slightly repand on the margin, and the veins and venules are hidden. Unlike those of *P. excavatum*, the sori are round and, when young, covered with small peltate scales with black reticulation. They also do not reach more than half-way down the frond. The ramenta on the rhizome show quite a distinct feature ; they are ovate-lanceolate, acuminate, laciniato-denticulate, and are marked with black reticulation.

This species is exclusively Japanese, being widely distributed over various parts of the country. According to Christensen,¶ it has also been found in Quelpart, the flora of which possesses a large proportion of Japanese elements.

11. **P. clathratum,** C. B. Clarke.

The extremely thin texture of the frond and the characteristic clathrate scales in the sorus and on the rhizome readily distinguish this species from any allied members of this genus.

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* Kumaon (Strachey and Winterbottom, n. 2) ; Darjiling (Griffith).

† Christ has erroneously determined this number to be *P. oligolepedum*, Bak. See Bull. Herb. Boiss. vi, p. 875 (1898).

‡ Cf. the present paper, p. 306.

§ Phan. Pter. Japon. Ic. Ill. i, sub tab. vii (1899) ; Id. in Tôkyô Bot. Mag. xiii, p. 48 (1899).

‖ Christ in Bull. Herb. Boiss. vi, p. 673 (1896).

¶ Bull. Acad. Intern. Geogr. Bot. xxi, p. 72 (1911).

The frond is perhaps the most polymorphic of its kind, so that if extreme forms are compared, they at first glance appear as if distinct species. A comparatively small form with narrow and pointed fronds, as delineated by Clarke,* was first described by himself in 1880 under the name of P. *clathratum*, while a still smaller form with very obtuse frond was described by Regel soon afterwards as *P. Alberti*.† A much larger form than Clarke's type, but similar to it, has been distinguished by Blanford as var. *jakonense*.‡ Through the kindness of Dr. T. Nakai I have been able to make out that *P. Uchiyamae*, Makino § is also a synonym of *P. clathratum*. As a matter of fact, the dimensions of fronds vary from 3 cm. up to over 30 cm. in length (exclusive of the stipe), and 5 mm. to 25 mm. in width. The apex may assume any form between roundish-obtuse to caudato-acuminate. The stipe is also subject to variation; the shortest examined measures 5 mm., while the longest one reaches 7 cm. In such circumstances it is quite impossible to draw any line between these varieties of shape. There is, however, an interesting variety of this species found in Tibet, which possesses small fronds more or less shortly three- to five-lobed at the base. The writer proposes to call this form var. *lobatum*.||

Some forms of this species resemble *P. nudum*, and others are similar in appearance to *P. excavatum*; from the former our plant can be distinguished by the thin membranaceous frond and the clathrate scales, and from the latter by the superficial sori and also by the nature of the scales.

The ripe sporangia are of a bright orange colour, and intermingled with them are often seen the peculiar black clathrate and strongly dentate scales. The sori are oblong or elliptical, and are often confluent.

This species is widely distributed over Turkestan, Afghanistan, Kashmir, Punjab, Nepal, and China. It is very interesting to note that it also occurs in the Loochoo Islands and in the province of Tosa, in Shikoku, Japan. The following specimens from China have been examined:—

Peking Mountains, shady rocks at 5000 ft., rare (Hancock,

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* Ferns N. Ind. p. 559 (1880), tab. lxxxii, fig. 1.

† Acta Horti Petrop. vii, p. 662 (1880, according to Christensen 1881).

‡ Ann. List of Ferns of Simla, p. 14 (no date).

§ In Tôkyô Bot. Mag. xx, p. 30 (1906).

|| Frondes aut longe (7 cm.) aut breviter (1 cm.) stipitatae, 3–6 cm. longae, 7–10 mm. latae, acutae vel obtusae, basi vel hastatae vel tri- (subquinque) lobatae, lobis brevibus, 5–25 mm. longis, acutis vel obtusis. Tibet, Lhassa (L. A. Waddell, Sept. 1904), Kyi chu Valley, 15 miles east of Lhassa (Walton, Aug. 1904); Gooring Valley, about 16,500 ft. (Littledale, July 1897).

n. 17); Thae-pei-san, Shenshi septentrional (Giraldi, Aug. 1896 *).

It is quite possible that *P. Soulianum*, Christ,† none of the authentic specimens of which has been examined by the writer, is a form of *P. clathratum*, Clarke.

The writer prefers to leave out remarks upon the Indian specimens of this species, and only refer to Hope's paper.‡

12. **P. boninense,** Christ.§

This species probably comes midway between *P. excavatum* and *P. clathratum*. The frond is, however, thicker and more rigid. The sori are immersed, round or slightly oblong, and are situated almost midway between the midrib and margin. Despite the thick and coriaceous texture of the frond, the costules are prominent, at least in dried specimens.

The ramenta are ovate-lanceolate, dark brown, clathrate, and ciliate-denticulate on the margin.

So far, this species has not been known to occur except in the Bonin Islands. The writer has seen the specimens collected by Wright in 1853–56. Besides these there are at Kew a few specimens of this species sent from the Imperial Academy, St. Petersburg (n. 41), which bear no collector's name.

13. **P. asterolepis,** Baker.

There is some confusion in nomenclature of this species The first name given to this species is *P. asterolepis*, Baker (1888). Baker erroneously reported this name in Annals of Botany, v, p. 474 (1891) as *P. aspidiolepis*, probably mixing it up with *P. aspidiolepis*, Bak. from Costa Rica. Christ, in 1905, when reducing this species to *P. simplex* (= *P. excavatum*), adopted Baker's misreported name, and called it *P. simplex* var. *aspidiolepis*, Christ. Meanwhile the same species was described by Baker as *P. macrosphaerum* in 1895, and again in 1906 as *P. intramarginale*. The full synonymy of this species will therefore be given in order to make the matter clearer:—

P. asterolepis, Baker in Journ. Bot. xxvii, p. 230 (1888).

Syn.:—*P. excavatum* var. *asterolepis*, C. Chr. Ind. Fil. p. 511 (1906).

P. aspidiolepis, Bak. in Ann. Bot. v, p. 474 (1891), by error.

---

* The specimen has been determined by Christ as *P. oligolepidum*. See Nuov. Giorn. Bot. Ital. n. ser. iv, p. 98 (1897).

† Soc. Bot. France, Mém. i, p. 15 (1905).

‡ Journ. Bombay Nat. Hist. Soc. xv (1903).

§ Warburg, Monsunia, i, p. 61 (1900); Kodama, in Matsum. Icon. Pl. Koishik. ii, sub tab. 89 (1914).

P. simplex var. *aspidiolepis*, Christ, in Bull. Soc. Bot. France, Mém. i, p. 16 (1905).

P. macrosphaerum, Bak. in Kew Bull. 1895, p. 55.

P. intramarginale, Bak., Christ, in Bull. Herb. Boiss. sér. 2, iii, p. 509 (1903); Bak. in Kew Bull. 1906, p. 13.

The position of the sori of this species is subject to variation. In the typical case the sori are intramarginal, as one of the synonyms suggests. Sometimes, however, they are situated between the midrib and the margin,* or even nearer the midrib.† In the description of *P. macrosphaerum* the sori are incorrectly said to be marginal. This is, however, due to the strong inrolling of the margin of the frond. In any case, this species is characterised by the ramenta on the rhizome, which are short, ovate, very obtuse, convex, entire, and fuscous-brown in colour. The texture of the frond is subcoriaceous to coriaceous, probably according to different circumstances of habitat.

The following specimens have been examined :—

CHINA. Hupeh : Patung (Henry, n. 1273, 2556) ; Kiangsi : Kuling Ravine (Morse, n. 24) ; Szechwan : Mt. Omei (Faber, n. 1063 ; Wilson, n. 5321) ; Yunnan : Tseku (Mombeig) ; Mengtsz (Henry, n. 9203, 10,042A, 13,363, part., 13,633 ; Hancock, n. 49) ; without locality (Ducloux, n. 438 ; Delavay, n. 4318).

INDIA. Khasia : Molim, 5800 ft. (Clarke, n. 43,627A).

14. **P. megasorum,** Christensen.

First described as *P. macrosorum*, Baker,‡ but the name has been changed to that given above. This fern has a similar appearance to the foregoing ; it differs, however, in the very thick texture and the obtuse apex of the frond, and the subulate, black, clathrate, ciliato-denticulate ramenta on the rhizome. The sori are always uniserial between the midrib and the margin. The dimensions of the frond vary from 5 cm. by 1 cm. or less to 20 cm. by 2 cm., and the stipe from 1 to 20 cm. in length.

This is an endemic species in Formosa, and appears to be not common. I have seen the following specimens :—

Kelung, on rocks (Wilford, n. 518) ; Tamsui (Hancock, n. 31).

15. **P. Fortuni,** Lowe.

This species furnishes us with an instance of the enormous variation exhibited by ferns in the dimension of frond. The smallest frond (fertile) examined measures about 19 cm. long and 1 cm. broad, whereas the largest one attained 105 cm. in length and 7 cm. in breadth (both including the stipe, which also varies from 1 to 15 cm. in length). As the characteristic features of this species we may mention that the frond is linear lanceolate, gradually tapering towards both ends, acuminate at the apex, decurrent at the base, thin, chartaceo-subcoriaceous, light green or dark when dry, with prominent but fine veins and venules, sori 2–3 mm. in diameter, strictly round, uniseriate and costal or irregularly biseriate, often reaching more than half way down or even to the base of the frond. The rhizome is thick and covered with ovate, obtuse, entire, fuscous-brown ramenta, and produces fronds at an interval of a centimetre or so.

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* In such specimens as Morse, n. 24 ; Wilson, n. 5321.

† Clarke, n. 43627A. This specimen is very poor, but probably belongs to this species.

‡ Journ. Bot. 1885, p. 106.

A stunted form with a narrow frond and uniseriate sori is not always easy to distinguish from *P. nudum.* However, in the present species the veins and venules are visible when the frond is dry, and the sori are strictly round, whilst in *P. nudum* veins and venules are hidden ; the ramenta of *P. nudum* are more pointed.

This fern was first described by T. Moore in 1855 as *Drynaria Fortuni*, which was afterwards reduced to *Pleopeltis nuda* by the author himself. Unfortunately the specimens from which the description was drawn up do not represent the typical form of this species, but rather a meagre, narrow-leaved form with uniseriate sori. The more typical form has been described in 1868 as *P. Chinense*, Mett. and *P. Pappei*, Mett., in 1877 as *P. normale* var. *madagascarensis*, Bak., and finally in 1898 as *P. Henryi*, Christ, which has recently been altered to *P. austrosinicum*, Christ (1906). The references to those synonyms are as follows :—

P. Fortuni, Lowe, Ferns, British and Exot. i, sub tab. 42B (1856).

Syn :—*Drynaria Fortuni*, Moore in Gard. Chron. 1855, p. 708.

P. Chinense, Mett. apud Kuhn in Seemann's Journ. Bot. vi, p. 270 (1868).

P. Pappei, Mett. apud Kuhn, Fil. Afr. p. 150 (1868).

P. normale var. *madagascarensis*, Bak. in Journ. Linn. Soc. xv, p. 420 (1877).

P. Henryi, Christ in Bull. Herb. Boiss. vi, p. 873 (1898), non Diels.

P. austrosinicum, Christ in C. Chr. Index Fil. p. 512 (1906), nec Christ in Bull. Acad. Intern. Geogr. Bot. xvi, p. 107 (1906).

I have examined the following specimens :—

FORMOSA. Tamsui (Hancock, n. 25) ; without locality (Oldham, n. 49 ; Swinhoe, 1862 *) ; Taitung (Faurie, n. 611).

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* The type specimen of *P. Chinense*, Mett.

CHINA: Fukien: Amoy (Swinhoe); Foochow (Swinhoe); Sansha Bay (no name of the collector); without locality (Hance, n. 6786 *); Chekiang: Ningpo (Hancock, Oct. 1877); Hangchow (Macarthy, Aug. 1870); Hupeh: Changyang (Wilson, n. 436); Ichang (Henry, n. 2230, 3135); Nant'o (Henry, n. 1994); also Henry, n. 7842; Kiangsi: Kiukiang (Shearer, 1873); Szechwan: Mt. Omei (Wilson, n. 5319); Henry, n. 7247, part.; Yunnan: (Henry, n. 9780 †); Long-ki (Delavay, 1894); Mengtsz, limestone rocks (Hancock, n. 47); mts., 5000 ft. (Henry, n. 9780, 13,363, part., 13,634); Kwangsi: Lungchow (H. B. Morse, n. 77). Other specimens from China: Poo-too-san Island (Fortune, n. 18 ‡); ht. Chelsea (Moore, 1856); § ht. Wentworth.§

S. AFRICA. Natal (M'Ken, n. 6; Sanderson, n. 2500 ||); Kaffraria (Rawson ||).

MADAGASCAR. Pool, Apr. 1876 ¶; Baron, n. 3681, 5310.

16. **P. normale,** Don.

As Clarke remarks,** the present species can easily be distinguished from its congeners by the very peculiar ramenta on the rhizome, which bear on their back a tuft of long reddish-brown bristles.

Hooker distinguishes three varieties of this species: *a*, *normalis*, *β*, *latifrons*, and *γ*, *sparsisora*.†† However, there is no distinguishing character whatever between the first and the last, and these have to be regarded as the type form. The var. *latifrons* is to be distinguished by the uni- or semi-bi-seriate sori on each side of the midrib. This varietal name is, however, very inappropriate, since there occurs a very narrow form of this variety.

P. normale a occurs in various parts of India, including Nepal, Khasia, Assam, and Bhotan. Hooker mentions only Malacca and Moulmein for the localities of var. *latifrons* ††; it is, however, found also in Khasia and Bhotan. The references given by Hooker to China and Formosa as to the habitat of this variety are due to the mistake of *P. Fortuni*, Lowe for the present fern.‡‡ Outside India the same variety is distributed

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* Referred to *P. normale* in Hook. Sp. Fil. v, p. 70.

† The type specimen of *P. Henryi*, Christ.

‡ The type specimens of *P. Chinense*, Mett. and *Drynaria Fortuni*, Moore.

§ The type specimens of *Drynaria Fortuni*, Moore.

|| The type specimens of *P. Pappei*, Mett., also referred to *P. normale* in Hook. and Bak. Syn. Fil. p. 358.

¶ The type specimen of *P. normale* var. *madagascarensis*, Bak.

** Ferns of N. India, p. 558 (1880).

†† Spec. Fil. v, p. 70. His remarks upon these varieties are, however, rather unintelligible.

‡‡ Ibid., also see under *P. Fortuni*, Lowe, in the present paper.

over Burma (Lace, n. 4733, 5128), Sumatra (Curtis and Matthew), China, and Formosa.* From China the following specimens have been examined :—

Yunnan : Szemao, S. mts., 4000 ft., on rocks ; (Henry, n. 12,947) ; Mengtsz, S. mts., 6000 ft., forest, on tree (Henry, n. 10,090 †) ; the same, forests of the Red River (Hancock, n. 198). Hongkong (Lamonti, 1875).

17. **P. hymenodes,** Kunze.

The identity of Wallich's *P. hymenodes* with *Leptochilus axillaris*, Kaulf. perhaps requires no comment.

Kunze's *P. hymenodes*, on the other hand, has long been unrecognised, and, according to Christensen's Index Filicum, it is regarded as a synonym of *P. superficiale* Bl.‡ It is, however, difficult to understand why such a mistake has arisen. Even a glance at Blume's excellent figures of *P. superficiale*, Bl. and Mettenius' careful illustrations of *P. hymenodes*, Kze. is sufficient to make out the distinction between these two totally distinct species.

Our plant resembles *P. normale*, Don in having a thin oblanceolate frond, which is acuminate at the apex and towards the base gradually decurrent into a very short stipe, and in having the sori irregularly scattered over the greater part of the undersurface of the frond. It can be, however, distinguished from the other by the nature of the ramenta on the rhizome, which are ovate-lanceolate, long-acuminate, ciliate-denticulate on the margin, and bear no bristles on the back.

The frond of the typical form of this species bears sori scattered over the whole under-surface, whilst that of the variety has sori situated near the margin, leaving a naked portion along the midrib.

This species is distributed over the northern parts of India, Western China, Melanesia, and Formosa. The synonymy and the specimens examined are as under :—

P. hymenodes, Kunze.

35179

a. **sparsisorum,** Takeda.

Syn. :—*P. hymenodes*, Kze., in Linnaea, xxiii, pp. 279, 319 (1850) ; Mett. Fil. Hort. Lips. p. 37, tab. xxv, fig. 40–41 (1856).

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[*] Oldham, 1864.

[†] This is the type specimen of *P. maculosum*, Christ, in Bull. Herb. Boiss. vi, p. 872 (1898). The specimen recorded by Christ as *P. maculosum*, Christ, in Bull. Acad. Intern. Geogr. Bot. xvi, p. 105 (1906) represents, however, *P. excavatum* var. *bicolor*, Takeda.

[‡] Hooker (Sp. Fil. v, p. 71) reduces Wallich's *P. hymenodes* to *P. superficiale*, Bl. He also remarks that Mettenius' figures of *P. hymenodes*, Kunze is "sufficiently satisfactory for our plant" (i.e. *P. superficiale*, Bl.).

P. superficiale var. *semilinearis*, Clarke, Ferns of N. India, p. 558 (1880).

P. subhemionitideum, Chr. in Bull. Herb. Boiss. vii, p. 5 (1899).

Sori per totam aream frondis irregulariter disparsi.

India. Nepal (Wallich. n. 274, partim, s.n. *P. longifrons*); Bhotan (Griffith).

Melanesia. New Guinea: Bismarck Mt. (R. Schlechter, n. 13,920).

China. Yunnan: Mengtsz (Hancock, n. 98; Henry, n. 9265B).

Formosa. Bankingsin Mts. (Henry, n. 1489).

Monstr. **anomalum,** (Christ) Takeda.

Syn.:—*P. anomalum*, Chr. in Bull. Herb. Boiss. vi, p. 201, tab. iii, fig. 3, *a–d* (1898).

P. heterolobum, C. Chr. Ind. Fil. p. 532 (1906).

Luzon. Mt. Data, 2250 met. (Loher).

This is only a monstrous form of this plant. The tendency to lobing of the frond is occasionally met with in several species of this genus such as *P. excavatum* (*v. supra*), *P ovatum*, *P. leucosorum*, *P. trisectum*, *P. pteropus*, and *P. hastatum*. This phenomenon is very interesting, as it shows how the pinnatifid forms of *Polypodium* have been derived from the simple-leaved forms.

5080 *β*. **marginale,** Takeda, **var. nov.**

Differt a typo soris marginem frondis versus aggregatis, ita frons secus costas nuda.

China. Yunnan: Mengtsz (Henry, n. 9265A); Yung-chang, 5000 ft. (Henry, n. 13,340).

18. **P. ensatum,** Thunberg.

This fern is not uncommon in the warmer parts of Japan, growing on rocks in wet shady localities. As is the case with *P. normale*, the sori are sometimes uniseriate, but sometimes bi-, tri- or multi-seriate on each side of the midrib, with the result that they become more or less irregularly distributed.

This species has several times been recorded from China in various floristic works.* However, there seems to have been some confusion with *P. ovatum*, Wall., and the true *P. ensatum* appears to be of rather rare occurrence in China. So far as I know, the only specimens I can safely refer to *P. ensatum*, Thunb. were collected in Milê District, Yunnan (Henry, n.

---

* Christ in Bull. Acad. Intern. Geogr. Bot. xi, p. 210 (1902); Diels, Fl. Centr. China, p. 203 (1900); Matthew in Journ. Linn. Soc. xxxix (1911).

9896). However, these particular specimens have been described as a distinct species under the name of *P. oligolepis*, Baker.* Although that author considers his fern as allied to *P. hemionitideum*, Wall., it actually represents *P. ensatum*, Thunb. with uniseriate sori.

19. **P. ovatum,** Wall.

This species gives an extraordinary case of variation in the shape of the frond, which has led Christ to create a new specific name—*phyllomanes.*† The writer does not, however, see any reason why a new name should be used instead of the well-known old name—*P. ovatum.* It is true that those peculiar forms have been described as different species, yet it is difficult to find any necessity to propose a new name when all those forms are united into one species. If such a practice be carried out, there would be introduced a great number of new names into the already complicated fern-nomenclature. However, I cannot doubt but that Christ is quite correct in uniting all those monstrous forms into one, notwithstanding the fact that the peculiar shape of the fronds has led other botanists to regard them as distinct species.

P. ovatum occurs in N. India, including Bhotan, Nepal, Sikkim, Khasia, and Manipur. It is, however, in China that the monstrosity has been found.‡ All the specimens but one or two which I have examined from China are quite normal and do not show the tendency to produce lobes. This species is closely related to the preceding; it differs, however, in the broad base of the frond and the more commonly multiseriate sori. The following specimens from China have been examined:—

Chekiang: Ningpo (Hancock, n. 8, Faber, Aug. 1885); Hupeh: without special locality (Henry, n. 7879), Ichang (Henry, n. 3123, 3279 §), Changyang (Wilson, n. 437); Kiangsi: Kiukiang (Shearer, 1873); Szechwan: Mt. Omei (Wilson, n. 5320, Faber, n. 1095 ||); Yunnan; Szemao (Henry, n. 10,078E), Mengtsz, shady rocks at from 5500–6700 ft. (Hancock, n. 55); Feng-chen Lin Mts. forest, 6800 ft. (Henry, n. 10,078C); Kwangsi: Lungchow (Morse, n. 72).

This species occurs also, but seldom, in Madagascar; a specimen with young thin fronds has been described as *P. Lastii*, Bak.¶

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* Kew Bull. 1898, p. 231. Also cf. the present paper, p. 307.

† Bull. Acad. Intern. Geogr. Bot. xi, p. 210, cum fig. (1902).

‡ *P. Rosthornii*, Diels (Engl. Bot. Jahrb. xxix, p. 205 [1900]) is probably one of the forms.

§ The type specimen of *P. deltoideum*, Bak. in Journ. Bot. 1888, p. 230.

|| This specimen has been recorded by Diels as *P. ensatum*. See Engl. Bot. Jahrb. xxix, p. 203 (1900).

¶ Baker in Journ. Bot. 1891, p. 5 (fide spec. original. in hb. Kew.).

20. **P. Buergerianum,** Miquel.

This fern has been recorded from China simply because *P. brachylepis*, Baker, which had been described from China, was reduced to *P. Buergerianum*, Miq.* Although this reduction was made by Mr. Baker himself, it is by no means correct, since his *P. brachylepis* was actually established on a specimen (probably young) of *P. superficiale*, Bl.†

The true *P. Buergerianum*, Miq. was really first recorded from China by Hooker,‡ but, unfortunately, since he mistook it for *P. superficiale*,§ the specimens were referred to as the latter plant; this has been confirmed by an examination of the original specimens.

Since Hooker's mistake the true *P. Buergerianum*, Miq. has always been called in Japan *P. superficiale*, Bl.; and the same error has been repeated by Luerssen.‖

P. Buergerianum differs from *P. superficiale* above all by the ramenta on the rhizome, which are ovate-lanceolate, long-acuminate, ciliato-dentate, and more or less patent, by the frond gradually attenuated below, and by the stipe short, narrowly winged with the decurrent base of the frond.

So far I have not been able to discover any specimen of the true *P. Buergerianum* from any other locality in China, except Hongkong and Macao, but it occurs in several places in the south and south-west of Japan and is also distributed as far as Tonkin, as will be seen in the following citation:—

P. Buergerianum, Miq. amplif.

25081 *α*. **stipitatum,** Takeda.

Syn.:—*P. Buergerianum*, Miq. Prol. Fl. Japon. pp. 334, 389; Bak. New Ferns, etc. p. 92, excl. syn. (1891).

P. superficiale, Hook. Sp. Fil. v, p. 71. quoad pl. ex Tsushima et Hongkong; Hook. Bak. Syn. Fil. p. 355, quoad pl. ex Tsushima et Hongkong; Luerssen, in Engl. Bot. Jahrb. iv, p. 360 (1883), et auct. Japon.

JAPAN. Tsushima (Wilford, n. 873); Hachijô (Dickins); Nagasaki (Faurie, n. 15,641).

FORMOSA. Tamsui District (Hancock, n. 28 ¶).

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* Baker, Summary of New Ferns, etc. in Ann. Bot. v, p. 475.

† Under the description of *P. brachylepis*, in Gard. Chron. n. ser. xiv, p. 494 (1880), the author states that his fern is "allied to *P. irioides* and *superficiale*." The plant has, however, no relationship with *P. irioides*.

‡ Species Filicum, v, p. 71.

§ Hooker, l.c. quoad pl. ex Hongkong et Tsushima, fide specc. in hb. Kew.

‖ Engl. Bot. Jahrb. iv, p. 360 (1883).

¶ The specimen has been recorded by mistake as *P. normale* var. *sumatranum*, in Journ. Bot. 1885, p. 106, n. 25.

CHINA. Hongkong (Wilford, n. 38) Macao (Harland).

TONKIN. "Mont Bavi, au dessus de Van-Maou vers 800 mèt. d'altitude" (Balansa, Jul. 1880).

β. **ningpoense,** (Bak.) Takeda. 1775

Syn.:—*P. ningpoense*, Bak. in Ann. Bot. v, p. 474 (1891).

Differt a typo solum frondibus sessilibus.

CHINA. Chekiang: Ningpo Mountains, on trunks of trees in deep shady glens (Hancock, n. 24); Kiangsi: Kiukiang (Shearer, 1873).

This variety, which was originally described as a distinct species, differs from the type merely by the strictly sessile frond; even in the type the length of the stipe varies to a certain extent.

21. **P. subhastatum,** Bak.

This interesting fern was described from China first by Baker, in 1889, under the name of *P. subhastatum*,* and again by Christ, in 1902, as *P. hederaceum*.† When describing his fern, Baker pointed out that the species comes "midway between *P. rostratum* and *P. Spectrum*." *P. subhastatum* has, however, no connexion with these two species whatever, but is, in fact, closely related to *P. Buergerianum*. Also his description of sori "placed in a single row midway between the midrib and margin in the upper part of the frond" requires correction. As a matter of fact, the sori are not regularly arranged as described, but are scattered sometimes over the whole under-surface of the frond. Christ rightly compares his *P. hederaceum* with *P. Buergerianum*, but from his statements I gather that the specimens of *P. Buergerianum* he had at his disposal must have been very poor, hardly representing the typical form, while his specimen from Higashiyama, Kyôto, appears to have been not the true *P. Buergerianum*, but a variety of the present species, known to the Japanese botanists as *P. Buergerianum*.

Franchet and Savatier cite on the authority of Ito Keiske, the Japanese name "Yanoneshida" under *P. Buergerianum*, Miq. enumerated in their publication.‡ This is certainly not correct; but how this mistake originated is not clear. However, the same mistake had been repeated by Makino §; this gave occasion to Japanese botanists to apply the wrong name to the fern with the local name of "Yanoneshida."

As has been said above, *P. subhastatum* is allied to *P. Buer-*

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* Journ. Bot. 1889, p. 177.

† Bull. Acad. Intern. Geogr. Bot. xi, p. 215 (1902).

‡ Enum. Pl. Japon. ii, p. 245 (1876–79).

§ Tôkyô Bot. Mag. 1896, p. 180; Ej. Phan. et Pter. Japon. Ic. Ill. sub tab. xxxiii (1899).

gerianum. It differs, however, from the latter above all by the frond, which abruptly narrows into a long, broadly-winged stipe, and also shows a tendency to become repand or more or less pinnatifid on the margin. The texture is thinner than in *P. Buergerianum.*

Our plant is distributed over Japan and China. There can be distinguished two forms as diagnosed below :—

12092 **P. subhastatum,** Baker in Journn. Bot. 1889, p. 177, amplif.

25893 *a.* **hederaceum,** (Christ) *mihi.* 17791

Syn. :—*P. hederaceum,* Christ in Bull. Acad. Intern. Geogr. Bot. xi, p. 215, cum fig. (1902).

Frondes et steriles et fertiles ovato-deltoideae, basi dilatatae, plus minus cordatae, fertiles raro quam steriles angustiores.

CHINA. Hupeh : without special locality (Henry, n. 5450).

24339 *β.* **longifrons,** *mihi,* var. nov.

Syn. :—*P. Buergerianum,* auct. Japon. non Miq.

Frondes steriles oblongo-ovatae, saepe minus cordatae, fertiles quam steriles plerumque multo longiores angustioresque, elongatae ad vel raro supra 20 cm. lg., basi plus minus cuneatae.

JAPAN. Without locality (ex hb. Coll. Sc. Imp. Univ. Tôkyô) ; in monte Higanesan (H. Takeda) ; also frequent in the south-west.

22. **P. superficiale,** Blume.

This fern was described and excellently figured by Blume in 1828. While all the records of the occurrence of this species in Japan have, without exception, been erroneous, the true *P. superficiale* is widely distributed over China, India, Java, Sumatra, etc.

This species resembles *P. Buergerianum* so strongly that these two have often been confused by not a few pteridologists. However, the larger size and thicker texture of the frond, the longer stipe with the basal portion quite unwinged, and, above all, the large pale brown, ovate, obtuse ramenta more or less appressed in the rhizome would readily distinguish the present species from *P. Buergerianum,* Miq.

The identity of *P. brachylepis,* Bak. with *P. superficiale,* Bl. has already been pointed out under *P. Buergerianum,* Miq. The same species has also been described by Baker in 1880 as *P. normale* var. *sumatranum,* and again in 1898 by Christ under the name of *P. nigrocinctum.* The latter author distinguishes his plant by means of the thicker texture, the shorter and broader, almost oval-shaped frond, and so forth. However, these

Vol. VIII. [FOR OFFICIAL USE.] Number XL.

NOTES
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CONTENTS.

Page
The Royal Botanic Garden i
List of Staff at March 1915 ii
Rules and Regulations iii
Historic Notice v
Regius Keepers ix
Principal Gardeners from 1756 x
Features of the Garden. With Key Plan . . xi
Teaching in the Garden xiii
Enumeration of Visitors, 1889–1914 . . . xviii
Diagnoses specierum novarum in herbario Horti Regii Botanici Edinburgensis cognitarum. CIII–CL . . 313
Moultonia, a New Genus of the Gesneraceae from Borneo. (With Plates CXLVI, CXLVII.) By Professor Bayley Balfour, F.R.S., and W. W. Smith, M.A. . . 349
Title (with date of Publication of separate numbers), Corrections, and List of Contents, Vol. VIII.

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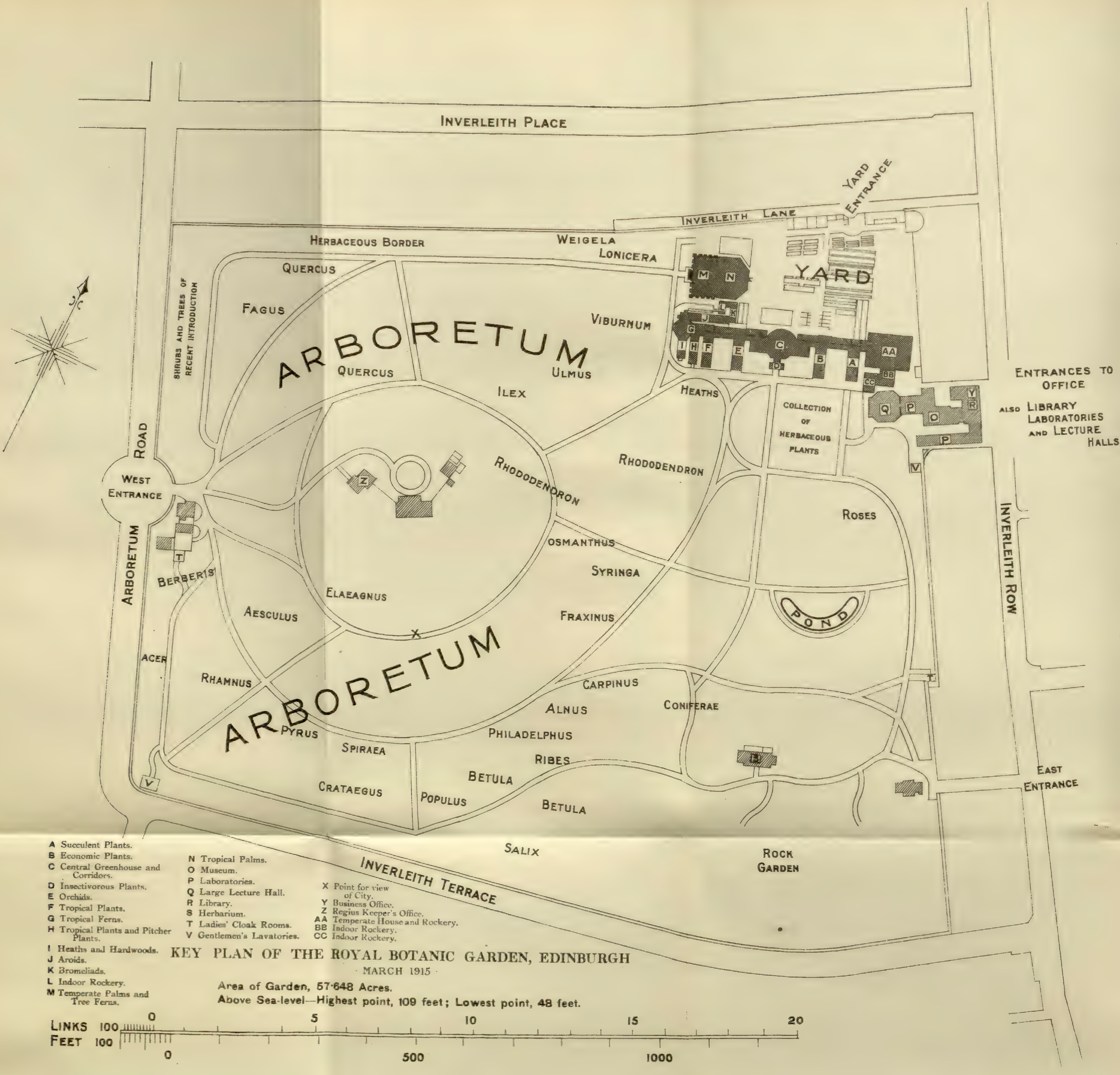

INVERLEITH PLACE
YARD ENTRANCE
INVERLEITH LANE
HERBACEOUS BORDER
WEIGELA
LONICERA
YARD
M
N
QUERCUS
FAGUS
SHRUBS AND TREES OF RECENT INTRODUCTION
ARBORETUM
QUERCUS
VIBURNUM
ULMUS
ILEX
J
K
L
G
I
H
F
E
C
D
B
A
AA
BB
CC
HEATHS
COLLECTION OF HERBACEOUS PLANTS
Q
P
O
Y
R
S
P
ENTRANCES TO OFFICE
ALSO LIBRARY LABORATORIES AND LECTURE HALLS
ROAD
WEST ENTRANCE
Z
RHODODENDRON
RHODODENDRON
ROSES
V
INVERLEITH ROW
ARBORETUM
T
BERBERIS
OSMANTHUS
SYRINGA
ELAEAGNUS
AESCULUS
FRAXINUS
POND
X
ARBORETUM
ACER
RHAMNUS
T
CARPINUS
ALNUS
CONIFERAE
PYRUS
PHILADELPHUS
SPIRAEA
RIBES
BETULA
V
CRATAEGUS
POPULUS
BETULA
EAST ENTRANCE
SALIX
ROCK GARDEN
INVERLEITH TERRACE
LINKS 100
FEET 100
0
5
10
15
20
0
500
1000

A Succulent Plants.
B Economic Plants.
C Central Greenhouse and Corridors.
D Insectivorous Plants.
E Orchids.
F Tropical Plants.
G Tropical Ferns.
H Tropical Plants and Pitcher Plants.
I Heaths and Hardwoods.
J Aroids.
K Bromeliads.
L Indoor Rockery.
M Temperate Palms and Tree Ferns.
N Tropical Palms.
O Museum.
P Laboratories.
Q Large Lecture Hall.
R Library.
S Herbarium.
T Ladies' Cloak Rooms.
V Gentlemen's Lavatories.
X Point for view of City.
Y Business Office.
Z Regius Keeper's Office.
AA Temperate House and Rockery.
BB Indoor Rockery.
CC Indoor Rockery.

KEY PLAN OF THE ROYAL BOTANIC GARDEN, EDINBURGH

· MARCH 1915 ·

Area of Garden, 57·648 Acres.

Above Sea-level—Highest point, 109 feet; Lowest point, 48 feet.

THE ROYAL BOTANIC GARDEN, EDINBURGH.

THE Royal Botanic Garden, Edinburgh, is one of three Gardens maintained by the State in the United Kingdom, the others being the Royal Gardens at Kew in England, and the Glasnevin Garden at Dublin in Ireland. It occupies an unequally-sided quadrilateral area of 57·648 acres (bounded upon all sides by public roads and dwelling-houses) on the north side of Edinburgh—about a mile from the shore of the Firth of Forth. Its highest point, at Inverleith House—the official residence of the Regius Keeper of the Garden—towards the north-west, is 109 feet above sea-level, and thence the ground falls away on all sides. The lowest point—a depression 48 feet above sea-level, with an east and west trend through the middle of the Garden—is the site of an old bog, and the ground rises again to the south of the depression. The surface soil is generally alluvial sand resting on clay at considerable depth. In the lower part of the area the clay comes to the surface.

There are two entrances to the grounds—one upon the east side from Inverleith Row into the **Garden,** the other upon the west side from Arboretum Road into the **Arboretum.** The entrance to the **Laboratories, Lecture Halls, Library,** and to the **Office** for Garden business is from Inverleith Row.

The **Garden** is open daily from **9 a.m.** on **Week-days** and from **11 a.m.** on **Sundays** until sunset.

The **Plant-Houses** are open from **1 p.m.** until **5.30 p.m.**, or until sunset if this be earlier.

The **Museum** is open on **Week-days** from **9 a.m.** until **5 p.m.** and on **Sundays** from **1 p.m.** until sunset.

The **Herbarium** is open on **Week-days** from **9 a.m.** until **5 p.m.,** excepting on **Saturday,** when it is open until **1 p.m.**

The **Library** is open on **Week-days** from **9 a.m.** until **10 p.m.**

The **Office** for transaction of business with the Public and with Tradesmen is open on **Week-days** from **9 a.m.** until **5 p.m.,** excepting on **Saturday,** when it is open until **1 p.m.**

Staff of the Royal Botanic Garden, Edinburgh, at March 1915.

ESTABLISHMENT.

Regius Keeper	Isaac Bayley Balfour, M.A., M.D., F.R.S.
Assistant Keeper	William Wright Smith, M.A.
Assistant in Museum	Harry Frank Tagg, F.L.S.
Assistant in Herbarium	John Frederick Jeffrey.
Assistant in Library	James Todd Johnstone, M.A., B.Sc.
Assistant in Laboratory	Matthew Young Orr.
Assistant in Studio	Robert Moyes Adam.
Head Gardener	Robert Lewis Harrow, F.R.H.S.
Plant Propagator	Laurence Baxter Stewart.
Typist	Jean Brockie.
,,	Annie Esther Robertson.
Medical Officer	James Wilson, M.D.

Assistant Head Gardener	Samuel Stewart.
Foreman of Arboretum	Alexander Johnstone.
Foreman of Glass Department	James John Campbell.
Foreman of Herbaceous Department	Vacant.

6394/565—1000—4/15.—N. & Co. Ltd. Gp. 10.

RULES for the Royal Botanic Garden and Arboretum in connection with the Regulations prescribed by "The Parks Regulation Act, 1872."

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1. No unauthorised Person may ride or drive in this Garden or in the Arboretum, and no Wheelbarrow, Truck, Bath-chair, Perambulator, Cycle, or other Vehicle or Machine, is allowed to enter, except with the written permission of the Keeper. Children under ten years of age are not admitted unless accompanied by a Parent or suitable Guardian.

2. No Horses, Cattle, Sheep, or Pigs are allowed to enter.

3. No Dogs are admitted.

4. No Bags, Baskets, or Parcels, no Flowers, and no implements for games may be brought in ; Artists and Photographers may not bring in their Apparatus without written permission from the Keeper.

> NOTE.—*The foregoing Rules shall not apply to persons going to or leaving Inverleith House by the road leading from the Arboretum Road Gate to the House.*

5. Visitors are to enter and leave the Plant-Houses by the Doors according to the Notices affixed thereon.

6. Smoking is not allowed in the Plant-Houses.

7. No Person shall touch the Plants or Flowers.

8. Picnics and luncheon parties are not allowed.

9. No unauthorised Person shall Drill or practise Military Evolutions or use Arms or play any Game or Music, or practise Gymnastics, or sell or let any Commodity.

10. No unauthorised Public Address may be delivered in the Garden or Arboretum. No Performance or Representation either spoken or in dumb show shall be given in any part of the Garden or Arboretum, unless by permission of the Commissioners of His Majesty's Works and Public Buildings. No Person shall use any obscene, indecent, or blasphemous words, expressions, or

gestures, or do any act calculated to provoke a breach of the Peace, in the course of, or in connexion with, any speech, address, performance, recitation, or representation. No money shall be solicited or collected in connexion with any performance, recitation, or representation, except by permission of the Commissioners of His Majesty's Works and Public Buildings.

11. Large parties must be broken up to prevent crowding.

12. Climbing the Trees, Railings, or Fences is forbidden.

13. Birds'-nesting, and taking, destroying, or injuring Birds or Animals are forbidden.

14. The distribution of Handbills, Advertisements, and other Papers by the Public is forbidden.

Dated the 28th day of April 1904.

Sealed with the Common Seal of the Commissioners of His Majesty's Works and Public Buildings.

SCHOMBERG K. M'DONNELL,
Secretary.

Seal.

Historic Notice.

IN the year 1670 a small portion of ground, known as St. Ann's Yards, lying to the south of Holyrood House, and usually let to market gardeners by the Hereditary Keeper of Holyrood House, was occupied by two eminent Edinburgh physicians, **Andrew Balfour** and **Robert Sibbald,** for the making of a Physic Garden, and **James Sutherland** was appointed to the "Care of the Garden." This was the foundation of the Royal Botanic Garden of Edinburgh, which is therefore, after that of Oxford (founded in 1632), the oldest in Great Britain. The Garden was stocked with plants from the private Garden of Dr. Andrew Balfour, in which for some years he had been accumulating medicinal plants, and also in great measure from that at Livingston in West Lothian, the laird of which, Patrick Murray, was much interested in the growing of useful plants. Shortly thereafter, but at what precise date has not yet been ascertained, Sutherland became custodian of the Royal Garden, which lay on the north side of the Palace, and it became a Physic Garden for instruction, whilst the original plot in St. Ann's Yards was, apparently, given up.

In 1676 the same physicians acquired from the Town Council of Edinburgh a lease of the Garden of Trinity Hospital and adjacent ground for the purpose of a Physic Garden in addition to the Garden already existing at Holyrood, and they appointed the same James Sutherland (1639?–1719) to be "Intendant" of this Garden. The site of this Garden, which for convenience of reference may be called the Town's Botanic Garden, was the ground lying between the base of that portion of the Calton Hill upon which the prison is built and the North Bridge, and it is now occupied by a portion of the Waverley Station of the North British Railway. The name Physic Garden attached to a street in the vicinity is a reminiscence of the existence of the Garden at this spot.

About 1702 another Botanic Garden was established in Edinburgh in the ground immediately adjacent to the College

Buildings, apparently on the site of the present South College Street. This was the College Garden, and of it James Sutherland became also custodian.

Thus in the early years of the eighteenth century there were in Edinburgh three distinct Botanic or Physic Gardens—one at Holyrood, the Royal Garden; one around Trinity Hospital, the Town's Garden; and one beside the College, the College Garden—all under the care of James Sutherland.

Sutherland from the first made use of the Royal Garden for giving "instruction in Botany to the Lieges," and received a royal warrant appointing him Botanist to the King in Scotland, and empowering him to "set up a Profession of Botany" in this Garden. When the Town's Garden was created the Town Council appointed him to lecture on Botany as Professor in the Town's College, now the University of Edinburgh. In 1683 he published his "Hortus Medicus Edinburgensis, or a Catalogue of the Plants in the Physical Garden at Edinburgh," from which and from other published notices we learn that between two and three thousand plants were in cultivation. There are no data available from which to determinate how these plants were distributed between the several Gardens at the date of publication of Sutherland's catalogue.

In 1706 Sutherland resigned the care of the Town's Garden and the College Garden as well as his Professorship in the University, but, remaining King's Botanist, he retained the care of the Royal Garden at Holyrood. Charles Preston (1660–1711) was appointed his successor by the Town Council, and there were thus established rival Gardens and rival Professors of Botany in Edinburgh. Charles Preston was succeeded in 1712 in his offices by his brother George Preston (1659–1749). Neither of the Prestons had ever the care of the Royal Garden.

Sutherland's appointment as King's Botanist, Keeper of the Royal Garden, and Regius Professor of Botany was held during the pleasure of the Sovereign, and on the death of Queen Anne in 1714 he was not continued in office by George I.

In 1715 **William Arthur** (1680–1716) received a commission as successor to Sutherland, but as he was implicated in an unsuccessful Jacobite plot to seize the Castle, he did not hold the office long.

He was succeeded in 1716 by **Charles Alston** (1685–1760).

In 1724 the College Garden, having fallen into disorder, was turned to other uses; and in 1729, George Preston having retired, the Town Council appointed, as his successor in the charge of the Town's Garden and as Professor of Botany in the University, Charles Alston, who as King's Botanist had already the charge of the Royal Garden and was Regius Professor of Botany. Through him, after separation for a quarter of a century, the Royal Garden and the Town's Garden were again combined under one Keeper, and the Regius Professorship of Botany and the University Professorship were similarly united. They have so continued to the present time.

In 1763, the Royal Garden and the Town's Garden proving too small and otherwise unsatisfactory, **John Hope** (1725–1786), who had succeeded Alston in his offices in 1761, proposed a transference of the two to a more congenial site in which they could be combined. At first it was intended to secure ground to the south of George Watson's Hospital—the area upon which much of the present Royal Infirmary is built—but this not being possible, five acres of ground to the north side of Leith Walk, below the site now occupied by Haddington Place, were chosen. As Hope proposed to transfer the collections in the Royal Garden to the new Garden he was able to secure the support of the Treasury to his scheme, and the selected ground was leased in name of the Barons of Exchequer. At the same time the Town Council agreed to contribute £25 annually to the support of the Garden, the sum being the amount of rent expected from the letting of the old Town's Garden. The plants from both Gardens were transferred to the ground at Leith Walk, and from this date there has been only one Botanic Garden in Edinburgh. The site thus secured for the Garden proved, however, only a temporary one.

Daniel Rutherford (1749–1819), who in 1786 succeeded Hope in his offices, cast about him for a spot in which more ground would be available for the extension of the Garden; and eventually in 1815 nine and a half acres of the land lying to the east of Holyrood Palace, and forming the ground of Belleville or Clockmill, was fixed upon as a site. This selection gave rise to controversy which was prolonged, and Rutherford died before any arrangements for the transference of the Garden had been made.

Robert Graham (1786–1845), his successor, appointed in 1820, preferred the more open site of the Inverleith property which the Garden now occupies, and fourteen acres of the Field or Park of Inverleith, known as Broompark and Quacaplesink, were purchased by the Barons of Exchequer from Mr. James Rocheid, its owner, in 1820, the lease of the Leith Walk Ground being sold. By 1823 all the plants had been transferred to the new Garden.

In 1858, during the Keepership of **John Hutton Balfour** (1808–1884), who succeeded Graham in 1845, a further addition, by purchase from the proprietor of Inverleith, of a narrow belt of two and a half acres was made to the Garden on the west side; and in 1865 the Caledonian Horticultural Society having resigned to the Crown its lease of the ten acres of adjoining ground which it had occupied since 1824 as an experimental Garden, this ground was also made part of the Botanic Garden. Finally the present area of the Garden was completed in 1876, when the Town Council purchased from the Fettes Trustees twenty-seven and three-quarter acres of Inverleith property on the west side of the Garden and transferred it to the Crown for the purpose of making an Arboretum in connection with the Garden; the Crown at the same time purchased Inverleith House and two and a half acres of additional ground.

In 1879, **Alexander Dickson** (1836–1887) became Queen's Botanist, Regius Keeper and Professor, and held these appointments until his death in 1887. During his term of office the Arboretum was opened to the public.

Surrounded as it now is on all sides by public roads, no further extension of the Garden upon its present site can be made.

Regius Keepers (R.K.) from the Foundation of the Garden.

JAMES SUTHERLAND	Born 1639? R.K. 12th January, 1699.* Not confirmed, 1714. Died 24th June, 1719.
WILLIAM ARTHUR	Born September, 1680. R.K. 10th May, 1715. Died 1716.
CHARLES ALSTON	Born 24th October, 1685. R.K. 30th June, 1716. Died 22nd November, 1760.
JOHN HOPE	Born 10th May, 1725. R.K. 13th April, 1761. Died 10th November, 1786.
DANIEL RUTHERFORD	Born 3rd November, 1749. R.K. 20th December, 1786. Died 15th December, 1819.
ROBERT GRAHAM	Born 7th December, 1786. R.K. 31st January, 1820. Died 7th August, 1845.
JOHN HUTTON BALFOUR	Born 15th September, 1808. R.K. 8th November, 1845. Retired 1880. Died 11th February, 1884.
ALEXANDER DICKSON	Born 21st February, 1836. R.K. 28th April, 1880. Died 30th December, 1887.
ISAAC BAYLEY BALFOUR	Born 31st March, 1853. R.K. 5th April, 1888.

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* This is the date of a Royal Warrant from William III., and no earlier one has been found.

Principal Gardeners (P.G.) from the Year 1756.

(The Names of those preceding Williamson are not yet known.)

John Williamson	P.G. 1756? Died September, 1780.
Malcolm M‘Coig	P.G. 1st January, 1782? Died 25th February, 1789.
Robert Menzies	P.G. 1st October, 1789. Died 22nd January, 1800.
John Mackay	Born 25th December, 1772. P.G. February, 1800. Died 14th April, 1802.
George Don	Born October, 1764? P.G. 1st October, 1802. Resigned 31st December, 1806. Died 15th January, 1814.
Thomas Sommerville	Born 1783? P.G. 1807? Died 17th March, 1810.
William M‘Nab	Born 12th August, 1780. P.G. April, 1810. Died 1st December, 1848.
James M‘Nab	Born 25th April, 1810. P.G. 1st January, 1849. Died 19th November, 1878.
John Sadler	Born 3rd February, 1837. P.G. 13th January, 1879. Died 9th December, 1882.
Robert Lindsay	Born 7th May, 1846. P.G. 3rd March, 1883. Retired 31st March, 1896. Died 24th September, 1913.
Adam Dewar Richardson	Born 12th September, 1857. P.G. 1st April, 1896. Resigned 31st May, 1902.
Robert Lewis Harrow	Born 26th March, 1867. P.G. 1st June, 1902.

Features of the Garden.

THE method through which the Garden was built up by successive additions resulted in an absence of combination between its several parts, in great measure a consequence of want of adequate funds to make the necessary alterations in the grounds. During the past twenty-six years, in which the Garden has been wholly under the administration of the Commissioners of H.M. Works, the bringing about of this combination has been in progress. The work is not yet completed, and the Plan of the Garden which is attached to this sketch shows the area of the Garden as it is laid out at this date—March, 1915. Future editions will show further changes as the work of reconstruction proceeds.

From its foundation the Botanic Garden has been devoted to the teaching of Botany, and its usefulness in this respect has determined the laying out of its area.

Herbaceous Garden.—A considerable space is occupied by a collection of herbaceous plants arranged for study in natural orders.

Rock Garden.—There is an extensive rockwork upon which alpine and rarer herbaceous plants are cultivated.

Arboretum.—The whole of the western area of the Garden is in process of arrangement as an Arboretum of trees and shrubs, and the positions of some of the chief genera are indicated on the plan. The Coniferæ are now placed in the ground adjacent to the Rock Garden.

Herbaceous Border.—Along the North Boundary of the Arboretum a mixed Herbaceous Border has been planted.

The **Plant-Houses** are still in process of reconstruction. So far as they have been rearranged at the present time they consist of a long range to the north of the herbaceous collection, composed of a Central Green-house (**C**), from the sides of which two Corridors run east and west. In the Entrance Porch (**D**) to the Central Green-house is a collection of Insectivorous Plants. From the Eastern Corridor two houses project to the south—one (**A**) occupied by Plants of Dry Regions, the other (**B**) containing

Economic Plants of both Tropical and Temperate Regions. Ending the Corridor is a house (**A A**) occupied by Temperate Shrubs and Trees and with Rock Plants; opening from it are houses (**B B** and **C C**) in which an indoor rockery has been built for Rock Plants which do not thrive in the open. To the south side of the Western Corridor are attached two houses—one (**E**) for Orchids and one (**F**) for Plants of Tropical and Warm Regions. The western end of the Corridor opens into a domed house (**G**) for Ferns of Tropical Regions which are planted out, and attached to it are two houses running southwards, one of which (**H**) is occupied by Tropical Plants, and the other (**I**) is used for Heaths and Hardwooded Plants. From the northern wing of this domed house opens a house (**J**) devoted to monocotylous Plants of Tropical and Warm Regions, specially Aroids, Scitamineæ, Liliaceæ, and Amaryllidaceæ. Out of this opens the house (**K**) for Bromeliads; and in another house (**L**) opening from this are Pitcher Plants. Behind the western end of the Front Range there is a Temperate House (**M**) for Palms, Tree-Ferns, and Coniferæ, and a Palm-House (**N**).

Adjoining Inverleith Row is a group of buildings including the **Museum** (**O**), the **Laboratories** (**P**), the **Lecture Hall** (**Q**), the **Library** (**R**), and the **Office** (**Y**), for transaction of business with the Public.

The **Museum** contains a series of exhibits illustrating the form and life-history of plants, and these are arranged so as to facilitate their use in teaching.

The **Library** contains over sixteen thousand volumes. The leading botanical and horticultural periodicals are taken and may be consulted like the other books by the public. Books are not lent from the Library.

Herbarium.—In the southern portion of the Garden is the Herbarium (**S**). It contains a fair representation of the Floras of the world.

Ladies' Cloak-Rooms are at (**T**) and (**T**). **Gentlemen's Lavatories** will be found at (**V**) and (**V**).

From the higher ground of the Arboretum—at the point marked (**X**) on the plan—a fine panoramic view of the City of Edinburgh, flanked on the east by Arthur's Seat, and on the west by the Pentland Hills, is obtained.

Teaching in the Garden.

In the year 1892 the Board of Agriculture, then recently established in England, assigned a small grant to the Royal Botanic Garden towards the institution of a Course of Instruction in the Sciences underlying the Practice of Horticulture and Forestry for the benefit of young men desiring to become gardeners and foresters. The fact deserves record, because it marks the introduction in Scotland of a systematised effort to provide scientific instruction to practical men in Gardening and Forestry.

The Course of Instruction has been carried on since. The following schedule—copies of which may be obtained by application to the Regius Keeper—indicates the terms upon which young men are at present admitted to the Course :—

Admission of Probationers.

1. The First Commissioner of His Majesty's Works is willing to consider applications from boys and young men intending to become Gardeners or Foresters who may wish to serve for a period in the Royal Botanic Garden, Edinburgh.

2. The number of boys and young men who can be so admitted is limited.

3. Such entrants will be in the position of Probationers, as a special class in the service of the Garden. Their work will be such as may be assigned to them, and they will work under all the regulations in force in the Garden.

4. Applicants must be unmarried and not over 25 years of age.

5. Each Applicant must furnish a medical certificate of fitness and a recommendation and certificate of character from a person of position to whom the Applicant is well known, and if the Applicant is or has been previously in a situation, a certificate from the present or last employer must be forwarded. Applicants who have had practical experience in Gardening or Forestry must state the amount of this and also if they have had experience of cultivation of plants under Glass.

6. Probationers will have the opportunity of attending a

Course of Instruction in the Sciences underlying the practice and the principles of Horticulture and Forestry free of charge, and they must attend the course, and also use the Library and Reading Room of the Garden. The subjects of Instruction, which are arranged in a curriculum extending over from two and a half to three years, are :—Botany, Chemistry, Entomology, Geology, Meteorology, Physics, Surveying and Mensuration, Bookkeeping, Horticulture, and Forestry, and these are taught practically as far as possible.

7. At the conclusion of the Course of Instruction the Probationer will in ordinary course give place to a new entrant.

8. Any Probationer who does not show satisfactory progress in studies, or who does not give satisfaction otherwise, will be removed.

9. A grant in aid (subsistence allowance) will be given to each Probationer. The amount given to a Probationer at admission will depend upon his age, experience, and capacity. The minimum will be at the rate of ten shillings a week, and the maximum at the rate of twenty-one shillings a week. Probationers who receive at entrance less than the maximum may, after admission, receive increments in relation to fitness and merit alike in the work of the Garden and in the Course of Instruction.

10. Holiday leave to the amount in all of eight working days in the year, in addition to Christmas Day, New Year's Day, Victoria Day, Spring and Autumn Holidays, is allowed after six months' service.

11. Probationers may be called upon to work on Sundays, and will receive remuneration for such work on a recognised scale.

12. Probationers will wear when at work a grey flannel shirt with turn-over collar of the same material, and a blue serge suit of clothes ; in the Glass and Herbaceous Departments an apron after pattern at the Garden must be worn.

13. Applicants must distinctly understand that the times of duty of Probationers are such as may be necessary, that admission as a Probationer is only an ordinary weekly hiring subject to a week's notice from any day, and subject to instant dismissal in case of misconduct, with subsistence allowance up to date of dismissal only, and does not entitle to any superannuation or to any compassionate or other allowance at the termination thereof, excepting such allowance or gratuity as might be awarded under the Superannuation Act, 1887 (Secs. 1 and 4), or any Act or

Acts amending the same. Further, in the event of any injury happening to a Probationer in respect of which compensation would be payable under the Workmen's Compensation Act, 1906, any sick pay which may be granted will be inclusive of such compensation payable under the Act in question, and an amount equivalent to such compensation will be deducted from any payment to dependants should the injury terminate fatally.

14. Boys or young men desiring admission as Probationers must fill up, in their own handwriting, the form below, and return this paper addressed to

THE REGIUS KEEPER,
ROYAL BOTANIC GARDEN,
EDINBURGH.

15. Applicants will be informed if their names have been entered for admission, and on a vacancy occurring will receive notice thereof. Should there be no vacancy within six months from the date of application, it must be renewed if the Applicant still desires to work as a Probationer in the Royal Botanic Garden. If not renewed, the applicant's name will be removed from the waiting list.

16. The First Commissioner desires to impress upon applicants that he grants this privilege in the expectation that Probationers will earnestly endeavour to make use of and profit by the opportunities of acquiring knowledge placed within their reach, and will recognise that it is incumbent upon them at the same time to perform with zeal the duties assigned to them.

Form to be filled up by Applicants for Admission as Probationers in the Royal Botanic Garden, Edinburgh.

Name of Applicant

Address

Date of Birth

Birthplace

Forester or Gardener

Name and address of present (or last) employer

Length of time in present situation

Previous situations and length of time in each (Gardeners to state amount of their experience in cultivation of plants under Glass)

Signature of Applicant ____________

Date ____________

Lectures to the Public.

The Regius Keeper from time to time gives lectures which are open to the public.

Research.

The **Laboratories** are open to anyone desirous of undertaking Botanical Research.

Specimens for Private Study.

Specimens for private study are supplied, as far as the resources of the Garden will permit, to visitors, teachers, and students who make written application to the Regius Keeper. Application forms may be obtained at the office of the Garden.

Botanical Department
of the
University of Edinburgh.

For more than a century and a half the offices of Regius Keeper of the Botanic Garden and Professor of Botany in the University of Edinburgh have been held by the same person, and it has become the custom that the students of the University come to the Garden for instruction in Botany. The whole work of the Botanical Department of the University is carried out in the Garden by the University Staff, which at this date is constituted as follows :—

Professor of Botany	Isaac Bayley Balfour, M.A., M.D., F.R.S.
Assistant and Lecturer on Botany	Robert Chapman Davie, M.A., B.Sc.
Assistant and Lecturer on Forest Botany	Albert William Borthwick, D.Sc.
Assistant and Lecturer on Mycology	Malcolm Wilson, D.Sc.
Assistant and Lecturer on Plant Physiology	James Lindsay Salmond Smith, M.A., B.Sc.
Assistant and Tutor in Botany	Vacant.

Enumeration of Visitors to the Royal Botanic Garden, Edinburgh, during the Years 1889–1915.

On the 1st of April 1889, the control of the Royal Botanic Garden, Edinburgh, was vested in the Commissioners of His Majesty's Works, and the Garden became subject to the "Act for the Regulation of the Royal Parks and Gardens, 1872." From the date specified the Garden has been opened to the public on Sundays, and also for an extended period on Week-days. The table below shows the number of visitors to the Garden on Sundays and Week-days respectively during the twenty-six years which have elapsed since the Garden was transferred to the Commissioners of His Majesty's Works:—

Year.	Total in Year.	Total on Sundays.	Largest Number on a Sunday.	Smallest Number on a Sunday.	Total on Week Days.	Largest Number on a Week Day.	Smallest Number on a Week Day.
*1889 ...	368,219	187,457	13,935	129	180,762	3,834	50
1890 ...	446,540	216,345	11,262	91	230,195	4,032	65
1891 ...	454,083	220,543	9,445	340	233,540	3,228	76
1892 ...	437,205	218,233	13,581	149	218,972	2,666	43
1893 ...	531,232	271,893	12,860	45	259,339	3,197	40
1894 ...	526,948	268,793	13,515	68	258,155	3,153	28
1895 ...	516,608	264,497	15,227	127	252,111	5,292	26
1896 ...	516,407	296,576	13,517	527	219,831	3,825	30
1897 ...	475,210	271,730	16,001	74	203,480	3,153	20
1898 ...	443,289	258,499	12,840	123	184,790	3,234	39
1899 ...	461,686	259,424	15,161	105	202,262	2,758	30
1900 ...	561,359	324,856	17,700	268	236,503	3,667	53
1901 ...	586,461	339,229	19,256	258	247,232	4,627	45
1902 ...	522,363	295,892	15,561	165	226,471	5,461	60
1903 ...	606,184	355,310	19,583	135	250,874	4,202	41
1904 ...	639,066	367,290	20,719	374	271,776	3,564	42
1905 ...	584,546	330,995	19,859	100	253,551	2,708	60
1906 ...	699,558	394,030	21,959	84	305,528	3,760	44
1907 ...	674,208	422,899	25,601	708	251,309	3,365	40
1908 ...	585,171	342,106	20,549	570	243,065	2,898	39
1909 ...	683,243	394,861	24,334	165	288,382	3,483	71
1910 ...	777,864	430,776	21,813	244	347,088	3,598	80
1911 ...	708,943	420,163	22,765	82	288,780	3,828	66
1912 ...	714,170	383,476	25,930	88	330,694	3,515	81
1913 ...	876,585	500,205	27,398	680	376,380	4,100	59
1914 ...	776,280	414,518	25,521	106	316,762	5,337	62
Total for Twenty-six Years.	15,173,428	8,450,596	...	...	6,677,832	...	...

* Numbers in this year for nine months only.

characters are rather unstable in this species, and an examination of the co-type specimens has convinced the writer that *P. nigrocinctum*, Chr. represents the typical *P. superficiale*, Bl.

The synonymy and the Chinese specimens examined by the writer are given below:—

P. superficiale, Bl. Fl. Jav. p. 136, tab. lvi, fig. 1 (1828).

Syn.:—*P. superficiale*, Hook. Sp. Fil. v, p. 71, part.; Clarke, Ferns of N. Ind., p. 557, excl. var.

P. brachylepis, Bak. in Gard. Chron. n. ser. xiv, p. 494 (1880).

P. normale var. *sumatranum*, Bak. in Journ. Bot. 1880, p. 215.

P. nigrocinctum, Christ in Bull. Herb. Boiss. vi, p. 874 (1898).

China. Szechwan: Mt. Omei (Faber, n. 1065); Yunnan: Mengtsz, rocks above the Red River, at 5000 ft. (Hancock, n. 166), limestone precipices at 8000 ft. (Henry, n. 106), S.W. mts. 7000 ft. (Henry, n. 9264), wooded cliff, 8000 ft. (Henry, n. 11,454), S.E. mts., 6000 ft., on tree (Henry, n. 11,454A); Szemao, W. mts., 5000 ft., on rock (Henry, n. 9264C).

With regard to the specimen recorded as *P. normale* var. *sumatranum* from Formosa, see under *P. Buergerianum*.

23. P. Steerei, Harrington.

So far as the writer is aware, this fern seems to be of comparatively rare occurrence. It was first described in 1877 from Formosa as *P. Steerei*; subsequently, in 1891, from Tonkin as *P. tonkinense*; and finally, in the next year, again from Formosa under the name of *P. Playfairii*.

The very thick, fleshy, broadly oblanceolate, sessile frond with numerous minute round sori, is very characteristic of this species, and immediately distinguishes it from its allied species.

The full synonymy and the examined specimens are as under:—

P. Steerei, Harr. in Journ. Linn. Soc. xvi, p. 32 (1877).

Syn.:—*P. tonkinense*, Bak. in Journ. Bot. 1890, p. 266.

P. Playfairii, Bak. in Ann. Bot. v, p. 474 (1891).

Luzon. Castillo (Loher, n. 867).

Formosa. Apes Hill, Takow (Henry, s.n., Steere, 1876, Playfair, n. 383).

Tonkin. "Tankenin, près de Guang-yen, sur les roches calcaires" (Balansa, n. 148).

Most of the specimens here cited are the types of each name given.

[Notes, R.B.G., Edin., No. XL, March 1915.]

Wt. 13/608—450—4/15—N. & Co., Ltd. Gp. 10.

24. **P. pteropus,** Blume.

Another polymorphic species in respect to the dimension and shape of the frond as well as the arrangement of sori. The frond may be either simple oblong-oblanceolate, or ternate, or pinnatifid with a long terminal and four lateral lobes, or in rare cases even palmatipartite with 5 oblong lobes. The sori are usually irregularly scattered, but are sometimes strictly uniseriate. They vary from round to oblong, and occasionally become confluent and grammitoid.

The plant often grows under water: then the frond is thin and firm. When it grows in drier situations, the frond becomes to some degree thicker.

The synonymy of this species is as follows:—

P. pteropus, Bl. Fl. Jav. Fil. cont. p. 168, tab. 76 (1829); Hook. Sp. Fil. v, p. 75; Hook. and Bak. Syn. Fil. p. 362.

Syn.:—*P. tridactylon*, Wall. List, n. 315; Benth. Fl. Hongk. p. 458 (1861).

P. Hancockii, Bak. in Journ. Bot. 1885, p. 106.

P. micropteris, Bak. in Kew Bull. 1906, p. 14.

P. aquaticum, Christ in Nova Guinea, viii, p. 153 (1909).

P. Hancockii was described from rather imperfect specimens. There are three pieces, two of which have simple, broadly oblanceolate, thin fronds with scattered sori, while the third is much larger and pinnatipartite with 5 lobes. This last-mentioned specimen is, unlike the typical *P. pteropus*, thick in consistency, but this may be due to the habitat. This third specimen is also much damaged by some external injury. The writer cannot help thinking that it is an abnormally thick-leaved specimen of *P. pteropus*.

P. micropteris, Bak. represents the simple-leaved form of this species which has been known as *P. pteropus* var. *minor*, Bedd. (Handb. p. 361).

The writer has been unable to find any distinction between *P. aquaticum*, Chr. and the typical *P. pteropus*.

The present species is widely distributed over India (Bhotan, Nepal, Assam, etc.), Ceylon, Malaccas, Philippines, Java, Sumatra, Hongkong, S.W. China, and Formosa. The following specimens from China and Formosa have been examined:—

CHINA. Yunnan: Szemao, E. mts., 6000 ft., in shade in forest (Henry, 12,630 *); Kwangsi: Lungchow, in wet ravine (Morse, n. 54).

HONGKONG. (Harland, 1857; Champion, n. 302; Wilford, n. 45).

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* The type specimen of *P. micropteris*, Bak.

FORMOSA. Tamsui district (Hancock, n. 23, 100,* Oldham, n. 58), Posia (Steere), Sao bay (Murphey).

25. **P. triglossum**, Baker.†

A species probably most closely allied to the preceding and also to *P. hemionitideum*, Wall. From the trifid form of the former it differs by the larger sori, the presence of ovato-lanceolate and strongly dentato-ciliate scales on the under surface of the frond, by the strongly dentate and clathrate peltate scales in the sorus, and by the veins not forming distinct series of areoles. From the other species it differs by the presence of scales in the sori, thinner and flexuose costules, less distinct veinlets, and the trifid frond—which last point may not be very important.

In the original description it is stated that the sori are uniseriate, but in fact they show a tendency to become biseriate. The author is also wrong in placing the present species near *P. trifidum*, Don; these two species have no close relationship whatsoever.

I have only seen the type specimen from Milê, Yunnan, collected by Henry (n. 9953).‡

26. **P. trisectum**, Baker.

This is a very distinct species, being well characterised by the presence of short glandular hairs § on both surfaces of the frond, although this important character is not mentioned in the original description. The frond varies from trifid to pedate, and the terminal segment sometimes shows the tendency to produce additional lobes, the frond thus becoming subpinnatifid. Its margin is thickened and provided with very shallow notches.

The first name given to this species is *P. trisectum*, Bak.,‖ and the second one is *P. podobasis*, Christ.¶ Christ has also given a name *P. accessorium*, which, so far as the writer has been able to ascertain, has not been published.

This species is exclusively Chinese; I have seen the following specimens:—Yunnan: Milê district, in woods (Henry, n. 9891); Szemao, W. mts., 5000 ft. (Henry, n. 9891A, 13,121A, 13,121B); "Col de Pi iousé" (Delavay, Sept. 1888).

The specimen recorded by Christ as *P. podobasis* in the Bull. Acad. Intern. Geogr. Bot. xvi, p. 106 (1906) is not identical with the real *P. podobasis*, Christ, but represents a small form of *P. oxylobum*, Wall.*

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* The type specimen of *P. Hancockii*, Bak.

† Kew Bull. 1898, p. 232.

‡ This specimen has also been described as *Selligea triphylla*, Chr. in Bull. Herb. Boiss. vi, p. 878 (1898).

§ Longer and more conspicuous than those in *P. pteropus*, Bl.

‖ Kew Bull. 1898, p. 232.

¶ Bull. Acad. Intern. Geogr. Bot. xi, p. 215 (1902).

27. P. Veitchii, Baker.

This fern was first described in 1880 from Japan as *P. Veitchii*; then in 1885 from Yunnan, China, as *P. glaucopsis*; and again next year from Japan by Maximowicz under the name of *P. senanense.* Some ten years afterwards M. l'Abbé G. Giraldi found the same species in the northern part of Shensi, China, and the plant was accordingly named by Christ *P. shensiense.* Later, when describing a variety of *P. shensiense,* Christ records its occurrence in Japan also.

This species generally grows among mosses on moist rocks in a comparatively high altitude. A frond of young age, or from a very much shaded locality, may be very thin and almost membranaceous, whilst one from an exposed habitat, which is not usual, may be chartaceo-subcoriaceous and very firm. *P. glaucopsis* is the name given to a specimen from a drier situation, having a rather rigid frond with very pronounced teeth on the margin, so that the type specimen appears at a casual glance to differ from *P. senanense.* However, several intermediate forms connect these two types. The names *P. Veitchii*, *P. senanense*, and *P. shensiense* have been given to a more typical form of this species, and a comparison of the type specimens has shown their perfect identity.

Our plant is not uncommon in Central Japan, and also occurs in Central and Southern China, as well as in Quelpaert. The synonymy and the specimens examined from China are as follows:—

P. Veitchii, Bak. in Gard. Chron. n. ser. xiv, p. 494 (1880).

Syn:—*P. glaucopsis*, Franch. in Bull. Soc. France, xxxii, p. 29 (1885).

P. senanense, Maxim. in Mél. Biol. xii, p. 571 (1886).

P. shensiense, Chr. in Nuov. Giorn. Bot. Ital. n. ser. iv, p. 99, tab. 3, fig. 2 (1898).

CHINA. Hupeh: (Henry, n. 6170, 6170A, 6170B); Shensi: "Montagne del Chae-pei-san" (Giraldi, Aug. 1895); Yunnan: "Montagne de Chĕ tchŏ tzè au dessus de Tapintze près de Tali" (Delavay, Aug. 1883). Western China: without locality (Wilson, n. 5341).

β. **nigrovenium,** (Chr.) *mihi.*

Syn.:—*P. shensiense* var. *nigrovenium*, Christ in Bull. Acad. Intern. Geogr. Bot. xvi, p. 106 (1906).

WEST CHINA. Without locality (Wilson, n. 5341A).

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* See also under *P. oxylobum.*

28. **P. crenato-pinnatum,** Clarke.

This species is closely allied to the foregoing, and to the first glance they appear almost identical. However, the distinction between *P. crenato-pinnatum* and *P. Veitchii* is very definite. The species under consideration is often much larger than the other, having usually acuminate pinnae which frequently show a tendency to become bipinnatifid, and are hardly deflexed, as has been correctly delineated by the author.* In *P. Veitchii* the frond is, however, much smaller, with fewer pinnae which are, except one or two near the apex, always very obtuse, and those of the basal pair are often deflexed. The ramenta on the rhizome in these two species are also different. Excellent figures of *P. Veitchii* have been published by Makino under the name of *P. senanense.*†

Christensen hesitatingly expresses his view of the identity of *P. pseudoserratum,* Chr. with *P. crenato-pinnatum,* Clarke.‡ There is, however, no room for doubt that these two are absolutely identical. Besides these just mentioned, our plant has received another name—*P. griseo-nigrum.*§ An examination of the type specimens has convinced the writer that it is conspecific.

The occurrence of *P. crenato-pinnatum* in China was first recorded by Clarke when he described his fern from India. Up to the present this species has been found only in Manipur, India, and Yunnan, China. The following specimens from China have been examined :—

Yunnan : Mengtsz, woods, 5000 ft. (Henry, n. 9895A), grassy mountain-slopes, 6300 ft. Hancock, n. 67) ; Szemao Hills, 4500 ft.–6000 ft. (Henry, n. 10,282) ; " Montagne de Yangiuchan, au dessus de Lankong " (Delavay, Aug. 1883).

29. **P. malacodon,** Hooker.

Now we have come to another group in which there has been much confusion. True *P. malacodon* is a very well-marked species, so that it does not require much comment. The frond is of a small to medium size, and has one to four falcate pinnae on each side, the margin of which is densely serrate with prominent cuspidate teeth.

This fern is not at all uncommon in the Himalayas. Its occurrence in China was first recorded by Baker,‖ and his information was based on a specimen collected by Henry in the

* Journ. Linn. Soc. xxv, p. 99, tab. xlii (1888).

† Phan. et Pter. Japon. Ic. Ill. tab. lxix, lxx (1901).

‡ Ind. Fil. p. 556.

§ Kew Bull. 1895, p. 55.

‖ Journ. Bot. xvii, p. 177 (1889).

Province of Hupeh.* Later, Christ enumerates the same name in the List of the Ferns collected by E. H. Wilson in Western China.†

A careful examination of these two specimens above-mentioned has shown that they do not represent the real *P. malacodon*, but *P. Stewartii*, Clarke. Unfortunately I have been unable to examine other specimens referred to *P. malacodon* by Christ, so that I cannot speak with certainty regarding the correctness of the identifications.

However, I have seen a specimen of the true *P. malacodon*, Hook. from Western China,‡ which has been known as *P. austrosinicum*, Christ,§ or *P. albido-glaucum*, C. Chr.|| Another specimen of *P. malacodon* I have examined was collected in Yatung, Tibet.¶

30. **P. Stewartii,** Clarke.**

As has been alluded to under the preceding species, some specimens of *P. Stewartii* have erroneously been recorded from China as *P. malacodon*. Although these two species are closely related, *P. Stewartii* can be distinguished from the other above all by the nature of the serration, which is not cuspidate-pointed as in its ally, and by the direction of the lowest pinnae, which are deflexed, while those of *P. malacodon* are invariably falcate and curved towards the apex of the frond or erect patent at most.

The occurrence of *P. Stewartii* in China has also been reported by Christ,†† who, on this occasion, reduced it to *P. malacodon* as a variety. I have not seen any of the specimens referred to by that pteridologist, so that I am not quite sure as to their correct identification.

The following specimens have been examined from China :—

Hupeh (Henry, n. 6170E). Szechwan : Mt Omei (Wilson, n. 5333). Tibet : Yatung (Hobson, 1897).

24310

31. **P. cyrtolobum,** Clarke.

In connexion with *P. malacodon* and other species of this group, I may perhaps say a few words about *P. cyrtolobum*.

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* Henry, n. 6170E.

† Bull. Acad. Intern. Geogr. Bot. xvi, p. 106, n. 24 (1906). The name is given as *P. malacordon*, Kooh., which is, however, undoubtedly meant by that author for *P. malacodon*, Hook.

‡ Wilson, n. 5343.

§ Bull. Acad. Intern. Geogr. Bot. xvi, p. 107 (1906), not Christ in C. Chr. Ind. Fil. p. 512 (1906).

|| Ind. Fil. Suppl. p. 58 (1913).

¶ Hobson, 1897.

** Ferns of N. Ind. in Trans. Linn. Soc. sec. ser. i, p. 563 (1880); *Pleopeltis Stewartii*, Bedd. Ferns Br. Ind. sub tab. cciv (1866).

†† Bull. Soc. Bot. France, Mém. i, p. 8 (1905).

The nearest affinity of this species is perhaps *P. malacodon*; Baker * united the former with the latter, and has drawn up a description which would fit both the species.

Our plant is characterised by the comparatively short stipe, a large graceful frond with long falcate pinnae, the margin of which is denticulate with low and not cuspidate teeth. The ramenta on the rhizome are much the same as in *P. malacodon*, being long-subulate, pale brown, fimbriate on the margin, and shiny black in the centre, but are generally longer. The spore of this species is almost smooth, as in *P. malacodon*.

P. cyrtolobum is not rare in Northern India, but seems to be not common in China. I have seen only one specimen from that country, which is very small, trifid with short basal lobes, resembling *P. hastatum* on the whole.†

P. cyrtolobum has been correctly described and figured by Clarke.‡

32. P. oxylobum, Wall.

There is little doubt about the identity of *P. oxylobum*, Wall. with *P. trifidum*, Don. As there is another *P. trifidum* published earlier than Don's species, this name, though older than *P. oxylobum*, cannot be used.

This species has been confused particularly with *P. hastatum* of Thunberg in many pteridological works, in spite of the fact that these two species are absolutely distinct.

P. oxylobum varies from ternate to pinnatifid, or may even be simple. In any case this species can be distinguished from *P. hastatum* by the absolutely entire margin of the frond, and by the larger size of the ramenta on the rhizome. When this species produces a lobed frond, it is always pinnatifid, whereas *P. hastatum* never produces pinnatifid fronds, but invariably pedate. However, both the species may become trifid in certain cases, which probably has caused the confusion. The spore of this species is echinate as in *P. hastatum*.

The following specimens have been examined from China and Formosa:—

CHINA. Kwangtung: Canton (Ford, Dec. 1878); Yunnan: Szemao, W. mts., 6000 ft. (Henry n. 10,080B); Mengtsz, rocky precipice in deep, dark glen (Hancock, n. 11); Szemao Mts., 6500 ft., on dry rocks (Henry, n. 13,074); Upper Yangtze (Francis); W. China (Wilson, n. 5331 §).

FORMOSA. South Cape (Henry, n. 1241).

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* Hook. and Bak. Syn. Fil. p. 363.

† Yunnan (Delavay, n. 3997).

‡ Ferns of N. Ind. in Trans. Linn. Soc. sec. ser. i, p. 563, tab. lxxxiii (1880).

§ The specimen has been recorded as *P. podobasis*, Chr.; see Bull Acad. Intern. Geogr. Bot. xvi, p. 106 (1906). The same number has again been described as *P. trifidum* var. *catadromum*, Christ, in Lecomte, Not. Syst. i, p. 33 (1909)!

33. **P. ebenipes,** Hooker.[*]

The pinnatifid frond of this species often resembles the foregoing. The present plant can be distinguished from *P. oxylobum* and others, above all, by the patent, regularly arranged pinnae, the margin of which is serrate with low teeth, and by the very black, shiny ramenta on the rhizome.

I have seen the following specimens from China :—

Yunnan : Maokon tschang (Delavay, Oct. 1883). Tibet : Yatung (Hobson, 1897).

34. **P. Faberi,** Christ.[†]

Unfortunately, the writer has not been able to see the original specimen of this species. It is doubtless one of this group, and may possibly be either *P. oxylobum* or *P. cyrtolobum*. However, the description being inadequate, it cannot be decided satisfactorily.

35. **P. hastatum,** Thunberg.

An extraordinarily polymorphic species, to nearly each form of which one or two names have been given by various herbarium botanists. Fronds may be either elliptical, a few cm. in length, very obtuse, or longer, lanceolate, and acute or acuminate, or more or less ovate, or much elongated, linear lanceolate, and entire or repand, or ternatifid, subtrifid, or even pedate, but never pinnatifid. The first-mentioned, extremely dwarf form has been called *P. hastatum* forma *pygmaeum*, Maxim.[‡] or *P. Matthewii*, Tutcher.[§] Little larger forms have been named *P. hastatum* varr. *nikoense*,[||] *simplex*,[¶] and *albopunctatum*, Chr.[**] *P. arenarium*, Bak.[††] is a form with a long simple frond, found in China, and *P. Melleri*, Bak.[‡‡] is a name given to a similar form gathered in Madagascar. Diels has been inclined to distinguish a ternatifid form with a stipe longer than the frond as *P. dolichopodum*,[§§] but this is nothing but the normal form of *P. hastatum*, Thunb. The form with the pedate fronds has been described by Christ as *P. chenopus* and *P. dactylinum*.[||||] A monstrous form with an inciso-laciniate frond has been called *P. hastatum* var. *incisum*, Mak.[¶¶] The majority of these different forms are, however, not fixed, and two or three different forms are often found on the same rhizome, so that in many cases, unless a special name be given to every frond detached from the rhizome, such a multinominal system would only be found ridiculous. Besides the shape and size, the frond may be either pale green beneath or glaucous, as in many other species of this group, so that this also cannot be reckoned as any diagnostic character whatever.

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[*] Sp. Fil. v, p. 88 (1863).

[†] Bull. Soc. France, Mém. i, p. 17 (1905).

[‡] Fl. As. Or. Fragm. p. 73 (1879).

[§] Journ. Linn. Soc. xxxvii, p. 68 (1905).

[||] Tôkyô Bot. Mag. xxiv, p. 242 (1910).

[¶] Bull. Acad. Intern. Geogr. Bot. xvi, p. 105 (1906).

[**] Ibid. xvii, p. 137 (1907).

[††] Kew Bull. 1895, p. 56.

[‡‡] Syn. Fil. p. 359 (1868).

[§§] Engl. Bot. Jahrb. xxix, p. 205 (1900).

[||||] Bull. Soc. Bot. Fr. Mém. i, p. 20 (1905).

[¶¶] Tôkyô Bot. Mag. xxiv, p. 30 (1910).

As the distinguishing character of this species the margin of the frond is the most reliable; it is constantly depressedly crenate with rather distant notches, as is beautifully delineated by Makino.* The sori are situated midway between the midrib and margin, or slightly nearer the midrib. The spore is densely echinate.

The present species is very widely distributed over Japan, Formosa, China, and Corea, and then reappears in Madagascar. I have seen the following specimens from China and Formosa:—

CHINA. Fukien: Foochow (Maries); Chekiang: Ningpo (Hanbury, 1854, Hancock, n. 37, Faber, Aug. 1885); Shangtung: Chefoo (Faber, Feb. 1890, Hancock, n. 10), Wei-hai-wei (Matthew, Feb. 1909); Hupeh: Nant'o (Henry, n. 3025, 4436); Szechwan: Mt. Omei (Faber, n. 1066, Wilson, n. 5325), Moupin (David, 1870).

FORMOSA. Tamsui (Hancock, n. 45, Wilford, n. 519, Swinhoe, 1862); Posia (Steere).

36. **P. Engleri,** Leurssen.

This fern very much resembles the simple-leaved form of the preceding species, so that Christ reduced it to *P. hastatum* as a variety.† The only distinguishing character is, as has been pointed out by Luerssen ‡ and figured by Makino,§ that the spore is absolutely smooth. The writer has not been able to examine any specimen with ripe spores, so that this point has been left undecided.||

This plant has been recorded from the south-west of Japan and Quelpart, where it occurs but seldom.

37. **P. Griffithianum,** Hooker.¶

Although this species is very closely related to *P. hastatum*, it is surprisingly invariable. This plant can be distinguished from its nearest ally by the much thicker, oblong-elliptical frond and by the larger costal sori.

It occurs in Northern India and Western China; from the latter country I have examined the following specimens:—

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* Phan. et Pter. Japon. Icon. Illus. tab. xxviii.

† Bull. Herb. Boiss. vi, p. 878 (1898).

‡ Engl. Bot. Jahrb. iv, p. 361 (1883).

§ Phan. et Pter. Japon. Icon. Ill. tab. xxix.

|| Cf. Appendix to the present paper, p. 308.

¶ Icon. Pl. sub tab. 955 (1854).

Yunnan: Mengtsz, shady rocks and on trees, 8000–9500 ft. (Hancock, n. 96); without special locality (Delavay, 1883–85). Western China (Wilson, n. 5322).

38. **P. drymoglossoides,** Baker.

A very interesting species, closely allied to *P. rhyncophyllum* and *P. salicifolium,* but is well characterised by the *Drymoglossum*-like appearance, as the name indicates.

This fern has a comparatively wide range of distribution in China; and as specimens have been collected in different localities from time to time, they have been described under various names. The synonyms and the specimens examined are as follows:—

P. drymoglossoides, Bak. in Journ. Bot. 1887, p. 170.

Syn.:—*P. moupinense,* Franch. in Nouv. Arch. Mus. Par. sér. 2, x, p. 121 (1887–88).

P. cyclophyllum, Bak. in Ann. Bot. v, p. 473 (1891).

P. drymoglossoides α, Chr. in Bull. Acad. Intern. Geogr. Bot. xi, p. 206, fig. dextr. (1902).

Chekiang: Ningpo (Hancock, n. 32); Kiangsu: Ling-yen-san, Soochow (Matthew, June 1904); Hupeh: Ichang (Henry, n. 1576); Nant'o (Henry, n. 2965, 4392); Changyang (Wilson, n. 1450); without precise locality (Henry, n. 5963); Szechwan: Mt. Omei (Faber, n. 1046), without locality (Henry, n. 7532A).

39. **P. rhyncophyllum,** Hooker.*

So far as the writer is aware, this species has not been recorded from China under its proper name, but has been confounded with the preceding species. However, Christ has noticed the difference, and distinguished it as *P. drymoglossoides β,* and has given a figure of the specimen.†

Although this fern is not uncommon in Northern India, it occurs but seldom in China; I have seen only the following specimens:—

Western China (Wilson, n. 5316). Central China (Wilson, n. 1379).

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* Icon. Pl. sub tab. 954 (1854).

† Bull. Acad. Intern. Geogr. Bot. xi, p. 206 (1902), fig. sinist.

INDEX TO THE SPECIES AND VARIETIES.

(See also addendum, p. 312.)

PAGE
Drynaria Fortuni Moore . . . 285
D. phlebodes Fée . . . 280
D. subspathulata Hook. . . . 270
D. Zeylanica Fée . . . 279
Pleopeltis elongata Kaulf. . . . 268
Pl. nuda Hook. . . . 279
Pl. Stewartii Bedd. . . . 298
Pl. Thunbergiana Kaulf. . . . 268
Pl. ussuriensis Rgl. et Maack . . . 271
Polypodium Alberti Rgl. . . . 282
P. annuifrons Makino . . . 281
    var. *distans* Nakai . . . 271
P. anomalum Christ . . . 288
P. aquaticum Christ . . . 294
P. arenarium Baker . . . 300
P. aspidiolepis Bak. . . . 283
P. asterolepis Bak. . . . 283
P. atropunctatum Gaud. . . . 268
P. austrosinicum Chr. . . . 285, 298
P. boninense Chr. . . . 283
P. brachylepis Bak. . . . 290
P. Buergerianum Miq. . . . 290
    α. *stipitatum* Tak. . . . 290
    β. *ningpoense* Tak. . . . 291
P. Buergerianum auct. Japon. . . . 292
P. bullatum Bak. . . . 280
P. chenopus Chr. . . . 300
P. Chinense Mett. . . . 285
P. clathratum Clarke . . . 281
    var. *lobatum* Tak. . . . 282
P. coraiense Chr. . . . 271
P. crenato-pinnatum Clarke . . . 297
P. cyclophyllum Bak. . . . 302
P. cyrtolobum Clarke . . . 298
P. dactylinum Chr. . . . 300
P. deltoideum Bak. . . . 289
P. distans Mak. . . . 271
P. dolichopodum Diels . . . 300
P. drymoglossoides Bak. . . . 302
P. ebenipes Hook. . . . 300
P. eilophyllum Diels . . . 274
P. elongatum Schrad. . . . 273
P. Engleri Luers. . . . 301
P. ensatum Thunb. . . . 288
P. excavatum Bory . . . 279, 280
    α. *concolor* Tak. . . . 280
    β. *bicolor* Tak. . . . 280
P. excavatum var. *loriforme* C. Chr. . . . 272
P. Faberi Chr. . . . 300
P. Fortuni Lowe . . . 284
P. gladiatum Wall. . . . 279
P. glaucopsis Franch. . . . 296
P. Griffithianum Hook. . . . 301

PAGE
P. griseo-nigrum Bak. 297
P. Gueintzii Mett. 273
P. Hancockii Bak. 294
P. hastatum Thunb. 300
    var. *albopunctatum* Chr. 300
    var. *Engleri* Chr. 301
    var. *incisum* Mak. 300
    var. *nikoense* Chr. 300
    var. *simplex* Chr. 300
P. hederaceum Chr. 292
P. Henryi Chr. 285
P. heterolobum C. Chr. 288
P. hymenodes Kze. 287
    α. sparsisorum Tak. 287
    β. marginale Tak. 288
P. hymenodes Wall. 287
P. intramarginale Bak. 284
P. involutum Bak. 274
P. Lastii Bak. 289
P. leiopteris Kze. 279
P. ,, Makino 271
P. Lewisii Bak. 275
P. lineare Thunb. 267
    α. Thunbergianum Tak. 268
    β. subspathulatum Tak. 270
    γ. ussuriense C. Chr. 271
    δ. loriforme Tak. 272
    ε. elongatum Tak. 273
    var. *abbreviatum* Chr. 270
    var. *caudatum* Mak. 274
    var. *contortum* Chr. 270
    var. *coraiense* Chr. 271
    var. *distans* Mak. 271
    var. *Elysianum* Blanf. 279
    var. *glaucosorum* Christ 274
    var. *Onoei* Mak. 270
    var. *polymorphum* Clarke 280
    var. *Schraderi* Sim 273
    var. *simplex* Bak. 280
    var. *steniste* Clarke 273
P. loriforme Wall. 272
P. macrosorum Bak. 284
P. maculosum Chr. 280, 287
P. malacodon Hook. 297
P. Matthewi Tutch. 300
P. megasorum C. Chr. 284
P. Melleri Bak. 300
P. mengtzeanum Bak. 276
P. micropteris Bak. 294
P. moupinense Franch. 302
P. nigrocinctum Chr. 292
P. ningpoense Bak. 291
P. normale Don 286
    var. *latifrons* Hook. 286
    var. *madagascarensis* Bak. 285

PAGE
P. normale Don—
  var. *normalis* Hook. . . . 286
  var. *sparisora* Hook. . . . 286
  var. *sumatranum* Bak. . . . 292
P. nudiusculum Kze. . . . 279
P. nudum Kze. . . . 277
P. oblongisorum C. Chr. . . . 275
P. oligolepidum Bak. . . . 276
P. Onoei Fr. et Sav. . . . 270
P. ovatum Wall. . . . 288
P. oxylobum Wall. . . . 296, 299
P. Pappei Mett. . . . 285
P. phlebodes Kze. . . . 280
P. phyllomanes Chr. . . . 289
P. Playfairii Bak. . . . 293
P. podobasis Chr. . . . 295
P. pseudoserratum Chr. . . . 297
P. pteropus Bl. . . . 294
  var. *minor* Bedd. . . . 294
P. rhynchophyllum Hook. . . . 302
P. Rosthornii Diels . . . 289
P. Schraderi Mett. . . . 273
P. ,, Milde . . . 271, 273
P. Scolopendrium Ham. . . . 280
P. senanense Maxim. . . . 296, 297
P. sesquipedale Wall. . . . 280
P. ,, Mett. . . . 279
P. ,, forma *leiopteris* Mak. . . . 271
P. shensiense Chr. . . . 296
  var. *nigrovenium* Chr. . . . 296
P. simplex Sw. . . . 280
P. Soulianum Chr. . . . 283
P. Steerei Harr. . . . 293
P. Stewartii Clarke . . . 298
P. subhastatum Bak. . . . 291
  α. *hederaceum* Tak. . . . 292
  β. *longifrons* Tak. . . . 292
P. subhemionitideum Christ . . . 288
P. subimmersum Bak. . . . 275
P. subintegrum Bak. . . . 275
P. sublineare Bak. . . . 276
P. superficiale Bl. . . . 292
  var. *semilinearis* Clarke . . . 288
P. tridactylon Wall. . . . 294
P. trifidum Don . . . 299
  var. *catadromum* Chr. . . . 299
P. triglossum Bak. . . . 295
P. trisectum Bak. . . . 295
P. tonkinense Bak. . . . 293
P. Uchiyamae Makino . . . 282
P. ussuriense Rgl. . . . 271
P. Veitchii Bak. . . . 296, 297
P. ,, var. *nigrovenium* Takeda . . . 296
P. Wightianum Wall. . . . 279
P. xiphiopteris Bak. . . . 276
Selligea triphylla Chr. . . . 295

APPENDIX.

The Chinese and Japanese Polypodiums of the Subgenus Pleopeltis in the Herbarium, Royal Botanic Garden, Edinburgh.

BY

H. TAKEDA, D.I.C.

THROUGH the courtesy of the authorities of the Royal Botanic Garden, Edinburgh, the writer has had an opportunity of examining the Chinese and Japanese specimens of *Polypodium* subg. *Pleopeltis*. Although the majority of them are the same as those mentioned in the foregoing paper, yet, as there are several specimens which require comment, and also many others from new localities, it is thought advisable to enumerate all the specimens examined. The excellent specimens of *P. hastatum* and of *P. Engleri* from various localities have afforded the writer the means of studying these two plants very closely. As the result, the distinguishing characters formerly held have proved to be insufficient for separation of these two species, so that *P. Engleri* has been entirely suppressed.

In this enumeration the species are arranged alphabetically. Except for a few cases, synonyms, etc., which can be found in the foregoing paper are not given, since this list is meant to be a supplement to the other. After each species which is dealt with in the foregoing contribution the corresponding number is indicated, with a view to facilitate reference.

1. **P. annuifrons,** Makino (10).

JAPAN. Prov. Mino: Yenasan (Sakurai, Aug. 1909, in hb. ips. et in hb. Yokohama Nursery Company). Prov. Shimotsuke: Chuzenji in Nikkô (Takeda, Aug. 1904). Prov. Mutsu: Towada (Faurie, n. 13,289). Prov. Ishikari in Yezo: Horonai (Faurie, no. 1273).

The specimens collected by Faurie and above referred to have been wrongly reported by Christ as *P. simplex* in Bull. Herb. Boiss. vi, p. 673 (1896).

2. **P. asterolepis,** Baker (13).

CHINA. Hupeh: Western Hupeh (Wilson, n. 2635). Yunnan: Mengtsz (Henry, n. 9203, 10,042, 10,042A).

Wilson's specimens are very similar to those collected by Morse (n. 24) in Kiangi, and by Wilson (n. 5321) in Szechwan, and referred to on page 284 of the present paper.

3. P. **Buergerianum,** Miquel (20).

JAPAN. Prov. Satsuma (Sakurai, in hb. Yokohama Nurs. Co., Sept. 1905). Prov. Tosa (Sakurai, Aug. 1908).

4. P. **crenato-pinnatum,** Clarke (28).

CHINA. Yunnan: Mengtsz (Henry, n. 9895A); Szemao (Henry, n. 10,284); vicinity of Yunnan-sen (Maire, n. 2732, 2760, 2800); flank of volcanic mountain, north-west of Tengyueh, lat. 25° 70′ N. (Forrest, n. 8390).

5. P. **drymoglossoides,** Baker (38).

CHINA. Hupeh (Henry, n. 3685; Wilson, n. 2647).

Henry's specimens are the largest examined. The sterile frond measures up to 7 cm. long, 2 cm. wide, while the fertile one reaches 12 cm. long, 8 mm. broad.

6. P. **eilophyllum,** Diels (2).

CHINA. Hupeh (Henry, n. 6859).

7. P. **ensatum,** Thunberg (18).

CHINA. Yunnan: Milê district (Henry, n. 9896).

JAPAN. Prov. Idzu: Mt. Higane (Takeda, Apr. 1906). Prov. Sagami: Mt. Ôyama (Sakurai, Aug. 1907, Aug. 1909; Bisset, n. 542); Miyanoshita in Hakone (Bisset, n. 543).

Henry's specimens from Yunnan are the co-type of *P. oligolepis*, Bak. The type specimens of *P. oligolepis* kept in Kew Herbarium possess only uniseriate sori, whereas the Edinburgh specimens have semi-biseriate to semi-triseriate sori, which character is also known to occur in *P. ensatum*, Thunb.

8. P. **excavatum,** Bory (9).

α. **concolor,** Takeda.

CHINA. Yunnan: on trunks of trees and humus-covered boulders in side valleys on the eastern flank of the Tali Range; lat. 25° 40′ N.; alt. 8000–9000 ft. (Forrest, n. 4927, pro parte).

β. **discolor,** Takeda.

CHINA. Szechwan: western Szechwan (Wilson, n. 2637). Yunnan: Mengtsz (Henry, n. 10,088); lava bed west of Tengyueh, lat. 25° N. (Forrest, n. 8083).

9. **P. Fortuni,** Lowe (15).

CHINA. Hupeh (Wilson, n. 2640). Szechwan (Henry, n. 7247). Yunnan: without precise locality (Henry, n. 10,090); Mengtsz (Henry, n. 9780, 13,634). Fukien: Lung yen chou (Schindler, n. 419). Kwangtung: Thai-yong (Dalziel, Jul. 1899).

10. **P. Griffithianum,** Hooker (37).

CHINA. Szechwan (Wilson, n. 2645). Yunnan: Mengtsz (Henry, n. 10,272A).

11. **P. hastatum,** Thunberg (35).

CHINA. Szechwan (Wilson, n. 2639). Yunnan: Milê district (Henry, n. 9897); Szemao (Henry, n. 12,633; 12,633B). Shangtung: Chefoo (ex hb. Carles).

FORMOSA. (ex hb. Carles).

JAPAN. Prov. Tosa (ex hb. Yokohama Nurs. Co.). Prov. Sagami: Yenoshima (Sakurai, Sept. 1910); Yokohama (Bisset, n. 3593; Faurie, n. 540); Misaki (ex hb. Yokohama Nurs. Co., Sept. 1909). Prov. Shimotsuke: Nikkô (Bisset, n. 1261, 1937, 1938, 3593).

A careful study of ripe spores has convinced the writer that they are usually echinate, but occasionally quite smooth or very little echinate, so that the sole distinguishing character of *P. Engleri* from the simple form of *P. hastatum* is not at all satisfactory. Henry's specimen (n. 9897) from Milê district has the exact appearance of *P. Engleri* delineated by Makino,* but possesses echinate spores, whereas some specimens from Japan of the typical *P. hastatum* have hardly echinate or perfectly smooth spores; in some cases two kinds of spores have been found from one and the same sorus. It is difficult to regard *P. Engleri* even as a variety of *P. hastatum*, so I propose to suppress the former altogether.

Nakai † distinguishes these two plants by means of length of the stipe, which is in *P. Engleri* more than 10 cm., and in the other less. This method is, however, altogether impracticable.

12. **P. hemionitideum,** Wallich.

CHINA. Kwangtung: Thai-yong (Dalziel, 1898, 1901).

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* Phan. Pterid. Japon. Icon. Illust. tab. xxviii.

† Tôkyô Bot. Mag. xxviii, p. 93 (1914).

13. P. **hymenodes,** Kunze (17).

α. **sparsisorum,** Takeda.

CHINA. Szechwan (Wilson, n. 2633). Yunnan: hills south of Tengyueh, lat. 25° N., alt. 7000 ft. (Forrest, n. 9453); Mengtsz (Henry, n. 9265B).

β. **marginale,** Takeda.

CHINA. Yunnan: Mengtsz (Henry, n. 9265, 9265A).

14. P. **lineare,** Thunberg (1).

α. **Thunbergianum,** Takeda.

CHINA. Yunnan: Milê district (Henry, n. 9893); eastern flank of Tali Range (Forrest, n. 4927 partim); Szemao (Henry, n. 10,062); Mengtsz (Henry, n. 10,087A). Kwangtung: Thaiyong (Dalziel, Jul. 1901). Kiangsu: Shanghai (Carles, Oct. 1881).

JAPAN. Prov. Ômi: Maebara (Faurie, n. 11,278). Prov. Idzu (Faurie, n. 15,500, 15,508). Prov. Musashi: Tôkyô (ex hb. Yokohama Nurs. Co., Aug. 1907); Ikegami (Sakurai, Aug. 1909). Prov. Sagami: Yokohama (Bisset, n. 539); Yokosuka (Bisset, n. 1939, 1940). Prov. Iyo: Matsuyama (Faurie, n. 11,633). Prov. Hitachi: Mt. Tsukuba (ex hb. Yokohama Nurs. Co., Aug. 1908). Prov. Shimotsuke: Nikkô (Mochidzuki, Sept. 1910). Prov. Rikuzen: Kesenuma (Faurie, n. 6085). Prov. Ugo: Akita (Faurie, n. 2216).

Forma **caudato-attenuatum,** Takeda.

Syn.:—*P. lineare* var. *caudatum,* Nakai, in Tôkyô Bot. Mag. xxviii, p. 97 (1914), non Makino.

JAPAN. Prov. Sagami: Kamakura (Faurie, n. 1893, partim?). Prov. Musashi: Ikegami (Sakurai, Aug. 1909).

Nakai (l.c. p. 96) distinguishes a form with a branched frond as var. *ramifrons.* This is, however, merely an extreme form of a monstrosity not uncommon amongst ferns.

β. **subspathulata,** Takeda.

CHINA. Fukien: Foochow (Carles, Apr. 1881).

JAPAN. Without locality (hb. N. Fraser; Bisset, n. 1260, 4558, part.). Prov. Musashi: Tôkyô (ex hb. Yokohama Nurs. Co., Sept. 1907); Ômiya (Sakurai, Aug. 1909).

γ. **ussuriense,** C. Chr.

JAPAN. Prov. Sagami: Mt. Kintoki in Hakone (Bisset, n. 526). Prov. Hitachi: Mt. Tsukuba (Sakurai, Aug. 1910). Prov. Shimotsuke: Nikkô (Bisset, n. 1259, 1262; Takeda, Sept. 1904).

δ. **loriforme,** Takeda.

CHINA. Szechwan (Wilson, n. 2634).

Forma **steniste,** Takeda.

CHINA. Hupeh (Henry, n. 5654; Wilson, n. 2642).

15. P. membranaceum, Don.

CHINA. Yunnan: vicinity of Yunnan-sen (Maire, n. 2353, 2833); flank of volcanic mountain to north-west of Tengyueh, lat. 25° 10′ N., alt. 7000 ft. (Forrest, n. 8464); Szemao (Henry, n. 9469D, 11,488C); south of Red River from Manmei, 6000 ft. (Henry, n. 9469); Mengtsz (Henry, n. 9469A).

16. P. normale, Don (16).

α. **latifrons,** Hook.

CHINA. Yunnan: Mengtsz (Henry, n. 10,090).

17. P. oblongisorum, Christensen (4).

CHINA. Yunnan: south of Red River from Manmei (Henry, n. 9194).

18. P. ovatum, Wallich (19).

CHINA. Hupeh (Henry, n. 3123, 7879). Szechwan (Henry, n. 7133). Yunnan: Feu chen lin Mt. forest, 6800 ft. (Henry, n. 10,078C); Mengtsz (Henry, n. 9774; 10,078A).

19. P. oxylobum, Wallich (32).

CHINA. Yunnan: south of Red River from Manmei, 6000 ft. (Henry, n. 10,080); Mengtsz (Henry, 10,080A); Szemao (Henry, n. 10,080B, 13,074, 13,074A).

20. P. Phymatodes, Linnaeus.

CHINA. Without locality (Harland, n. 34). Kwantung: Thai-yong (Dalziel, Sept. 1899, July 1901).

FORMOSA. Lambay Isle (Henry, n. 1133).

21. P. pteropus, Blume (24).

CHINA. "Prope Hongkong in aqua leviter fluente super rupes crescentem" (Hance, n. 1051).

22. P. Steerei, Harrington (23).

FORMOSA. Takow (Henry, sin. num.).

23. **P. Stewartii,** Clarke (30).

CHINA. Hupeh (Henry, n. 6170A, pro parte).

24. **P. subhastatum,** Baker (21).

β. **longifrons,** Takeda.

JAPAN. Prov. Idzu: Mt. Higanesan (Takeda, Apr. 1906, Sakurai, Nov. 1910, Sept. 1907).

25. **P. subimmersum,** Baker (5).

CHINA. Yunnan: Mengtsz (Henry, n. 11,826).

26. **P. sublineare,** Baker (6).

CHINA. Yunnan: south of Red River from Manmei (Henry, n. 9062A); Feng chen lin Mts. (Henry, 11,827).

27. **P. subrostratum,** Christensen.

CHINA. Yunnan: Mengtsz (Henry, n. 13,302).

28. **P. superficiale,** Blume (22).

CHINA. Yunnan: Mengtsz (Henry, n. 9264).

29. **P. triglossum,** Baker (25).

CHINA. Yunnan: Milê Mountain forest (Henry, n. 9953).

30. **P. trisectum,** Baker (26).

CHINA. Yunnan: vicinity of Yun-nan-sen (Maire, n. 2731, 2831; Milê district (Henry, n. 9891); Szemao (Henry, n. 9891A, 13,121, 13,121A, 13,121B).

31. **P. Veitchii,** Baker (27).

CHINA. Hupeh (Henry, n. 6170A, pro parte, 6170B). Szechwan (Wilson, n. 2644).

JAPAN. Prov. Kai: Mt. Komagatake (Sakurai, Aug. 1910). Prov. Shimotsuke: Nikkô (Coll. ?, 23rd Aug. 1887).

32. **P. Wallichianum,** Spring.

CHINA. Yunnan: Mengtsz (Henry, n. 10,079, 10,079A, 11,514).

The foregoing enumeration of the species of the subgenus *Pleopeltis* in the Herbarium of the Royal Botanic Garden, Edinburgh, necessitates a short supplement to the Index on pages 303–5. Five additional species have to be noted.

ADDENDUM TO INDEX (pp. 303–5).

PAGE
P. ***hemionitideum***, Wall. 308
P. ***membranaceum***, Don 310
P. ***Phymatodes***, Linn. 310
P. ***subrostratum***, Christ. 311
P. ***Wallichianum***, Spring 311

As the species in this Appendix are arranged in alphabetical order, there is no need for a detailed index.

DIAGNOSES

Specierum novarum
in herbario Horti Regii Botanici Edinburgensis cognitarum.

CIII-CL.

The species described in this series are :—

SPECIES BORNEËNSES :—

Alangium kinabaluense, W. W. Sm., p. 315.
Anerincleistus monticolus, W. W. Sm., p. 316.
Antidesma cauliflorum, W. W. Sm., p. 316.
Argostemma humifusum, W. W. Sm., p. 317.
Argostemma sarawakense, W. W. Sm., p. 318.
Boea Brettiana, W. W. Sm., p. 319.
Clerodendron Brookeanum, W. W. Sm., p. 320.
Dendrochilum Dewindtiana, W. W. Sm., p. 321.
Gynura albicaulis, W. W. Sm., p. 322.
Ilex Havilandii, Loesener, var. major, W. W. Sm., p. 323.
Lucinaea parvifolia, W. W. Sm., p. 323.
Neurocalyx matangensis, W. W. Sm., p. 323.
Oldenlandia santubongensis, W. W. Sm., p. 324.
Pleomele sarawakensis, W. W. Sm., p. 325.
Randia kuchingensis, W. W. Sm., p. 326.
Timonius Esherianus, W. W. Sm., p. 327.
Tristania Moultoniana, W. W. Sm., p. 328.
Vaccinium borneënse, W. W. Sm., p. 329.

SPECIES CHINENSES :—

Acer oblongum, Wall., var. biauritum, W. W. Sm., p. 329.
Adenophora Forrestii, Diels, var. minor, W. W. Sm., p. 330.
Agapetes Wardii, W. W. Sm., p. 330.
Androsace Graceae, G. Forrest, p. 331.
Anthriscus yunnanensis, W. W. Sm., p. 331.
Aster pycnophyllus, Franch. mss., p. 332.
Betula Delavayi, Franch., var. calcicola, W. W. Sm., p. 333.
Betula Delavayi, Franch., var. Forrestii, W. W. Sm., p. 332.
Boottia echinata, W. W. Sm., p. 333.
Crepis setigera, Scott, p. 333.
Didissandra Agnesiae, G. Forrest, p. 334.
Eria obvia, W. W. Sm., p. 335.
Eriolaena yunnanensis, W. W. Sm., p. 336.
Herminium Souliei, Rolfe, var. lichiangense, W. W. Sm., p. 337.
Impatiens clavicuspis, Hook. f. mss., p. 337.
Impatiens cyclosepala, Hook. f. mss., p. 338.

Impatiens Forrestii, Hook. f. mss., p. 339.
Impatiens pinetorum, Hook. f. mss., p. 339.
Impatiens polyceras, Hook. f. mss., p. 340.
Magnolia taliensis, W. W. Sm., p. 341.
Pleurospermum aromaticum, W. W. Sm., p. 341.
Pleurospermum linearilobum, W. W. Sm., p. 342.
Rhododendron Clementinae, G. Forrest, p. 343.
Rhododendron Roxieana, G. Forrest, p. 344.
Saxifraga macrostigma, (Franch.) Engl. et Irmscher, var. cordifolia, W. W. Sm., p. 345.
Tanacetum Delavayi, Franch. mss., p. 345.
Trachydium ? simplicifolium, W. W. Sm., p. 346.

Species africanae :—

Bulbophyllum inopinatum, W. W. Sm., p. 346.
Polystachya Hamiltonii, W. W. Sm., p. 347.

Species himalensis :—

Sedum Praegerianum, W. W. Sm., p. 348.

The species fall into the following natural orders :—

Aceraceae : Acer oblongum, Wall., var. biauritum, W. W. Sm., p. 329.
Alangiaceae : Alangium kinabaluense, W. W. Sm., p. 315.
Campanulaceae : Adenophora Forrestii, Diels, var. minor, W. W. Sm., p. 330.
Compositae : Aster pycnophyllus, Franch. mss., p. 332.
Crepis setigera, Scott, p. 333.
Gynura albicaulis, W. W. Sm., p. 322.
Crassulaceae : Sedum Praegerianum, W. W. Sm., p. 348.
Cupuliferae : Betula Delavayi, Franch., var. calcicola, W. W. Sm., p. 333.
Betula Delavayi, Franch., var. Forrestii, W. W. Sm., p. 332.
Ericaceae : Rhododendron Clementinae, G. Forrest, p. 343.
Rhododendron Roxieana, G. Forrest, p. 344.
Euphorbiaceae : Antidesma cauliflorum, W. W. Sm., p. 316.
Geraniaceae : Impatiens clavicuspis, Hook. f. mss., p. 337.
Impatiens cyclosepala, Hook. f. mss., p. 338.
Impatiens Forrestii, Hook. f. mss., p. 339.
Impatiens pinetorum, Hook. f. mss., p. 339.
Impatiens polyceras, Hook. f. mss., p. 340.
Gesneraceae : Boea Brettiana, W. W. Sm., p. 319.
Didissandra Agnesiae, G. Forrest, p. 334.
Hydrocharideae : Boottia echinata, W. W. Sm., p. 333.
Ilicineae : Ilex Havilandii, Loesener, var. major, W. W. Sm., p. 323.
Liliaceae : Pleomele sarawakensis, W. W. Sm., p. 325.
Magnoliaceae : Magnolia taliensis, W. W. Sm., p. 341.
Melastomaceae : Anerincleistus monticolus, W. W. Sm., p. 316.
Myrtaceae : Tristania Moultoniana, W. W. Sm., p. 328.
Orchideae : Bulbophyllum inopinatum, W. W. Sm., p. 346.
Dendrochilum Dewindtiana, W. W. Sm., p. 321.
Eria obvia, W. W. Sm., p. 335.
Herminium Souliei, Rolfe, var. lichiangense, W. W Sm., p. 337.
Polystachya Hamiltonii, W. W. Sm., p. 347.

PRIMULACEAE : Androsace Graceae, G. Forrest, p. 331.
RUBIACEAE : Argostemma humifusum, W. W. Sm., p. 317.
Argostemma sarawakense, W. W. Sm., p. 318.
Lucinaea parvifolia, W. W. Sm., p. 323.
Neurocalyx matangensis, W. W. Sm., p. 323.
Oldenlandia santubongensis, W. W. Sm., p. 324.
Randia kuchingensis, W. W. Sm., p. 326.
Timonius Esherianus, W. W. Sm., p. 327.
SAXIFRAGEAE : Saxifraga macrostigma, (Franch.) Engl. et Irmscher, var. cordifolia, W. W. Sm., p. 345.
STERCULIACEAE : Eriolaena yunnanensis, W. W. Sm., p. 336.
UMBELLIFERAE : Anthriscus yunnanensis, W. W. Sm., p. 331.
Pleurospermum aromaticum, W. W. Sm., p. 341.
Pleurospermum linearilobum, W. W. Sm., p. 342.
Tanacetum Delavayi, Franch. mss., p. 345.
Trachydium ? simplicifolium, W. W. Sm., p. 346.
Agapetes Wardii, W. W. Sm., p. 330.
VACCINIACEAE : Vaccinium borneënse, W. W. Sm., p. 329.
VERBENACEAE : Clerodendron Brookeanum, W. W. Sm., p. 320.

SPECIES BORNEËNSES.

Alangium (Marlea) kinabaluense, W. W. Sm. Sp. nov.

Inter species adhuc descriptas foliis parvis flores vix superantibus facile recognoscitur.

Frutex; altitudo non nota; ramuli crassiusculi primo tomentelli deinde glabrescentes saepe muscis hepaticisque epiphyticis tecti. Folia 2–3 cm. longa, 1–2 cm. lata, elliptica vel late obovata apice rotundata brevissime emarginata basi late cuneata vel subrotundata coriacea integerrima utrinque glabra, costa supra impressa subtus multo elevata nervis utrinque 5–6 plus minusve distinctis. Cymae contractae circ. 2 cm. longae 3–6-florae juxta apices ramulorum positae minute tomentellae, pedunculo brevissimo saepe vix evoluto pedicellis 3–4 mm. longis bracteis circ. 2 mm. longis lanceolatis vel subulato-lanceolatis. Calycis fulvo-tomentelli limbus in dentes 4 ovatos acutiusculos 1 mm. longos partitus ovario anguste turbinato circ. 3 mm. longo costulato. Petala loriformia fere 2 cm. longa extus dense rufo-tomentella intus dense albido-villosa. Stamina 4, 1.5 cm. longa vel paulo ultro filamentis dense longiuscule albo-villosis antheris usque ad 5 mm. longis. Stylus cylindricus stamina paulo superans glaber; stigma capitatum simplex. Drupa deest.

Borneo :—In Sarawak on Mt. Kinabalu at an altitude of 13,000 ft. 25th Sept. 1913. Native Collector. No. 49 in Herb. Edin.

A very remarkable species distinguished at once by the very small leaves. I find no previous record of any *Alangium* from this mountain.

Anerincleistus monticolus, W. W. Sm. Sp. nov.

Species affinis *Anerincleisto Beccarii*, Cogn. a quo foliis basi cuneatis petalis subulato-acuminatis inter alia recedit; ad *A. glomeratum*, King foliis appropinquat inflorescentia valde divergit.

Fruticulus; altitudo non nota. Caulis teres brevissime denseque adpresseque fulvo-strigillosus. Folia petiolo 2–3 cm. longo fulvo-strigilloso suffulta anguste elliptica vel elliptico-lanceolata 10–15 cm. longa 2–4 cm. lata basi cuneata apice caudato-acuminata integra chartacea vel in siccitate subcoriacea supra fusco-viridia setulis minutis aspersa praeterea (sub valido lente) furfuracea infra pallidiora in nervis dense fulvo-strigillosa caetera setulis minutis conspersa 5-nervia venis transversis 3–4 mm. inter se distantibus subrectis. Panicula terminalis pedunculo usque ad 4.5 cm. longo dense fulvo-strigilloso suffulta ad 10 cm. longa tota fulvo-strigillosa. Flores saepissime 3-nati ad pedunculorum secundariorum ± 1 cm. longorum apices umbellatim positi; pedicelli ± 5 mm. longi. Calyx late cupularis 2–3 mm. longus 2–3 mm. latus 4-dentatus densissime fulvo-strigillosus; dentes brevissimi vix 1 mm. longi triangulari-ovati obtusi persistentes strigillosi. Petala 2–2.5 mm. longa (ex collectore rubra) ovata longiuscule subulato-acuminata nonnunquam setulis pluribus dorso ornata subcoriacea. Stamina 8, subaequalia 4 paullo majora; antherae majores 3 mm. longae sublineares basi longiuscule bilobae utrinque inappendiculatae minores oblongae 2 mm. longae basi bilobae. Ovarium vertice coronula 4-loba ornatum; stylus multo deflexus apice inflexus; stigma punctiforme. Capsula 3 mm. paullulo superans quadrivalvata valvis triangularibus.

Borneo :—On Mt. Santubong, Sarawak. 13th March 1914. Native Collector. No. 154.

This new species is closely allied to *A. Beccarii*, Cogn., but is at once distinguished by the leaves. The collector states that the colour of the flowers is red; this may refer to the stamens; the corolla is somewhat coriaceous, and, as far as one can judge from the dried specimens, presents no vivid colours.

Antidesma cauliflorum, W. W. Sm. Sp. nov.

Species *cauliflora* ex affinitate *A. Roxburghii*, Wall.

Frutex ramis cortice griseo praeditis ramulis subteretibus primo ± dense fulvo-tomentosis atque -pilosis mox glabrescentibus. Folia magnitudine variabilia, majora 40 cm. longa, 12 cm. lata, minora 12–14 cm. longa, ± 3 cm. lata, oblonga vel oblongo-elliptica subcaudato-acuminata basi ± late cuneata chartacea supra glabra subnitentia infra costa nervisque ± dense adpresse fulvo-pilosa cetera glabra vel subglabra ± nitentia nervis lateralibus utrinque 8–16 intra marginem arcuatis utrinque conspicuis subtus paulo elevatis nervulis distinctis bene reticulatis ; petioli 3–20 mm. longi primo dense fulvo-tomentosi tandem glabri incrassati cortice griseo rugoso ; gemmae ovoideae fulvo-tomentosae. Spicae masculinae e caule vetusto orientes fasciculatae 2–20-natae, 15–20 cm. longae simplices vel basi ramosae substrictae erectae, dense fulvo-tomentellae (ut bracteae lanceolatae 3–4 mm. longae), pedunculo 2–3 cm. longo suffultae. Calyx vix 0.5 mm. longus 3-partitus extus dense pubescens. Discus parvus villosulus ovarii rudimento minimo vel nullo. Stamina 2–3, circ. 1.5 mm. longa filamentis glabris. Racemi feminei flexuosi spicis masculinis similes origine magnitudine pedunculis bracteis indumento congruentes ; pedicelli 1 mm. longi villosuli ; calyx circ. 0.5 mm. longus extus dense pubescens brevissime vel vix lobatulus. Ovarium juventute non visum, semimaturum 7–8 mm. longum ovoideum dense adpresse villosulum.

Borneo :—Limbang, Sarawak. Haviland. No. 726 ♂ in Herb. Kew.

Near Kuching, Sarawak. Haviland. No. 730 ♂ in Herb. Kew.

Baram. May 1894. Haviland. No. 3263 ♀ in Herb. Kew. ; July 1894. Haviland and Hose. No. 3264 ♂ in Herb. Kew.

Kuching. April 1914. Native Collector. No. C133 ♂ in Herb. Edin.

A species readily distinguished by its cauliflory.

Argostemma humifusum, W. W. Sm. Sp. nov.

Species ex affinitate *A. Elatostemmatis*, Hook. f. ; foliis membranaceis, parium minoribus petiolatis inter alia recedit.

Planta herbacea ± 12 cm. longa. Caulis prostratus basi nudus teres glabratus supra sat foliosus ± complanatus setulis vermiculiformibus ± dense conspersus. Folia opposita valde inaequalia ; majora 6–9 cm. longa, 3–4.5 cm. lata, obovata vel subelliptica, apice lata ± breviter acuminata, basi ± late cuneata saepius valde inaequalia, margine integra vel paulo undulatula setoso-ciliata membranacea supra atroviridia sparsius setulis vermiculiformibus obsita subtus minute crebre pustulata nervis setosis utrinque 7–8 paulo elevatis ; petioli 1–2 cm. longi setosuli ; parium folia minora ± 1 cm. longa ± 6 mm. lata ovata petiolo circ. 5 mm. longo praedita, cetera majoribus subsimilia; stipulae laminis foliorum minorum subsimiles late ovatae persistentes. Flores albi in pedunculis usque ad 2.5 cm. longis subglabris terminalibus umbellatim dispositi; pedicelli 6–8, ± 5 mm. longi subglabri; bracteae plures late ovatae pedicellis multo breviores sparse minute pilosulae, involucriformiter aggregatae. Calycis circ. 3 mm. longi tenuiter membranacei tubus subcampanulatus circ. 1.5 mm. longus extus minute villosulus, lobi 5 fere rotundati glabri. Corolla 5 mm. longa vel paulo ultro haud bene aperta extus sparse pilosula. Stamina 5 filamentis brevissimis antheris cohaerentibus truncato-rostratis. Fructus deest.

Borneo:—Sarawak. 1865–67. Beccari. No. 150 in Herb. Kew.

Gunong Bayat, Sarawak. March 1914. Native Collector. No. D131 in Herb. Edin.

This species much resembles an *Elatostema* in habit, as does the closely allied species *A. Elatostemma*, Hook. f.

Argostemma sarawakense, W. W. Sm. Sp. nov.

Species ex affinitate *A. Elatostemmatis*, Hook. f., et *A. ophirensis*, Maingay, et *A. johorensis*, Ridley; caule glabro, parium foliis minoribus stipulas simulantibus et aequantibus inter alia recognoscenda.

Planta herbacea 30 cm. alta vel paulo ultra. Caulis basi ± prostratus nodis radicans supra ascendens vel suberectus sat foliosus subteres striatulus mox albescens squamuloso-decorticans. Folia opposita valde inaequalia; majora 6–12 cm. longa, (plerumque 7–8 cm.), 1.5–4 cm. lata, ovato-lanceolata vel lanceolata vel lineari-lanceolata apice acuta vel longiuscule acuminata basi rotundata vel ± late cuneata integra vel margine paulo undulatula coriacea supra atroviridia glabra subtus tomento brevissimo fulvido dense velata; costa subtus paulo elevata glabrescens, ut linea nigrida apparet; nervi utrinque 6–8, supra obscuri subtus distincti; petioli ± 5 mm. longi; parium folia minora 6–7 mm. longa lanceolata vel sublinearia sessilia vel subsessilia glabra vel sparse pilosula in caule inferiore saepe delapsa; stipulae foliis minoribus subsimiles paulo latiores saepe ovato-lanceolatae integrae. Flores albi in pedunculis usque ad 3 cm. longis glabris terminalibus umbellatim dispositi; pedicelli ± 12, ± 1 cm. longi ± pilosuli; bracteae plures stipulis subsimiles involucriformiter aggregatae. Calycis subcoriacei nec reticulato-venosi tubus subcampanulatus circ. 2 mm. longus extus ± fulvo-pilosulus, lobi 5, circ. 2 mm. longi, ± late ovati ± obtusi, extus pilosuli vel subglabri intus glabri. Corolla 4–5 mm. longa ad medium vel ultro 5-partita (raro

3-partita !) lobis ovatis obtusis. Stamina plerumque 5, circ. 3 mm. longa antheris cohaerentibus. Ovarium biloculare; stylus apicem versus dense pilosulus stigmate capitellato. Capsula (una matura visa) apice (operculatim ?) dehiscens seminibus fibris paleaceis intermixtis; fructus maturi plures valde desiderantur.

Borneo :—Haviland. No. 689 in Herb. Kew.

Kuching; herb, flower white. Sept. 1892. Haviland. No. 1613 in Herb. Kew.

Kuching. May 1893. Haviland. No. 2958 in Herb. Kew.

Kuching; corolla, calyx and pedicels white. Nov. 1894. Haviland and Hose. No. 3408 in Herb. Kew.

Kuching; flower white, in swampy ground. Aug. 1913. Native Collector. No. 28 in Herb. Edin.

Sarawak, in swampy ground. Nov. 1913. Native Collector. No. 85 in Herb. Edin.

An interesting species with very unequal pairs of leaves. On the lower shoots the smaller leaves (which much resemble the stipules) and stipules are often deciduous, and the plant then appears to be alternate-leaved. The structure of the flower is quite that of *Argostemma*, although the corolla is not markedly rotate and the seeds appear to be intermingled with a quantity of paleaceous fibres. There is only one ripe fruit (Haviland and Hose, 3408) available, which I have refrained from dissecting fully. Some mature fruits are much desired to settle this somewhat interesting point.

Boea Brettiana, W. W. Sm. Sp. nov.

Species affinis *B. crassifoliae,* Hemsl. quae foliis supra glabris nec dense villosulis inter alia recedit.

Herba brevicaulis nonnunquam fere acaulis; rhizoma longum crassissimum lignosum apicem versus vaginis alutaceis foliorum praeteritorum dense indutum; caulis pars foliata plerumque 8–10 cm. alta nonnunquam multo brevior quadrata dense albido- vel fulvo-tomentosa. Folia basi lata sessilia pleraque basalia vel subbasalia 10–30 cm. longa 2–5 cm. lata lineari-oblanceolata vel anguste spathulata vel oblongo-spathulata apice subobtusa vel subacuta basi paulo attenuata crassissima coriacea margine undulatula supra atroviridia densissime atque subscabridule villosula, hic illic flocculoso-albido-lanata, subtus tomento densissimo mollissimo albido vel fulvido induta; costa supra ut linea albida apparens infra eminens usque ad 3 mm. lata; nervi supra evanidi infra utrinque 8–12 satis distincti. Inflorescentiae amplae 10–30 cm. longae fructu usque ad 40 cm. auctae, nunc caulem terminantes nunc subscaposae in plantis subacaulibus, nunc multae valde effusae ex axillis omnibus orientes superiores longissimae inferae breviter evolutae; pedunculi et ramuli pedunculorum cum pedicellis 1 cm. longis densissime fulvido-araneoso-tomentosi multiflori apice laxe cymosi; bracteae lanceolatae vel lineares parvae tomentosae. Flores (expansi) fere 2 cm. diametro caerulei. Calyx circ. 4 mm. longus dense fulvo-tomentosus alte 5-fidus in lobos lineares 3 mm. longos subaequales anteriores paullulo longiores. Corollae glabrae tubus brevis calycem paulo superans late campanulatus; limbus 2-labiatus, labio antico 1.2 cm. longo in lobos tres subrotundatos diviso labio postico 2-lobo multo breviore. Stamina 2 inclusa glabra sub medio tubo affixa filamentis incurvis 5–6 mm. longis antheris maximis circ. 5 mm. longis multo induratis arcte agglutinatis. Ovarium glabrum circ. 2.5 mm. longum, stylo filiformi glabro 8 mm. longo stigmate parvo truncatulo. Capsula linearis 3–3.5 cm. longa spiraliter torta seminibus minutis fusiformibus.

Borneo:—Mt. Start; limestone, at 1500 ft.; corolla blue. Haviland. No. 1460 in Herb. Kew.

Ban; limestone rocks; flowers blue. Ridley. No. 11,724 in Herb. Kew.

Near Sudan, Sarawak. Native Collector. No. 14 in Herb. Edin.

A very beautiful species with an ample inflorescence of blue flowers; evidently a xerophytic plant. The species is dedicated to the Ranee Mudah of Sarawak.

Clerodendron Brookeanum, W. W. Sm. Sp. nov.

Species valde affinis *Clerodendro myrmecophilae,* Ridley; foliis acuminatis textura multo tenuioribus corollae tubo multo longiore inter alia recedit.

Suffrutex ramulis subquadratis junioribus saltem non fistulosis cortice griseo praeditis. Folia siccitate tenuiter membranacea opposita integra plerumque oblonga apice abrupte breviterque acuminata basi rotundata vel paullulo attenuata utrinque glabra 25–30 cm. longa, 8–10 cm. lata; nervi utrinque 7–8, graciles subtus paulo elevati; petioli 7–8 cm. longi rigidi. Panicula terminalis multiflora minute glanduloso-puberula cum pedunculo rigido circ. 10 cm. longo usque ad 30 cm. longa, circ. 8 cm. lata; rami divaricati complanati cymulis paucifloris; bracteae 3–4 mm. longae lineares vel subulatae puberulae; bracteolae multae lineares vel setaceae; pedicelli graciles rubropurpurei 5–10 mm. longi. Calyx ± 5 mm. longus siccitate rubescens puberulus in lobos lineari-lanceolatos acuminatos ad duas partes divisus. Corolla circ. 3 cm. longa siccitate rubroaurantiaca; tubus gracilis cylindricus circ. 2.3 cm. longa; lobi anguste obovato-oblongi apice rotundati superiores paululo longiores. Stamina longissime exserta (2–3 cm.) filamentis gracillimis rubris antheris minimis. Ovarium subglobosum; fructus deest.

Borneo:—Near Gunong Bayat, Sarawak. Jan. 1914. Native Collector. No. 142 in Herb. Edin.

Also a sheet without collector's name or number under *C. macrophyllum*, Hook. mss. (nec Sims) in Herb. Kew.

Haviland and Hose, No. 3560 in Herb. Kew., from Kuching, Sarawak, appears to be the same.

As pointed out by Sir Joseph Hooker in Bot. Mag. under tab. 7887, the Bornean plant is closely allied to *C. myrmecophila*, Ridley. The manuscript name *C. macrophyllum*, Hook., is antedated by *C. macrophyllum*, Sims, a synonym of *C. serratum*, Spreng.

The specific name is in honour of the Rajah of Sarawak.

Dendrochilum (Platyclinis) Dewindtiana, W. W. Sm. Sp. nov.

Species affinis *D. grandifloro* (Ridl.) Pfitz. sed floribus majoribus labello multo diverso inter alia discrepat; in eodem monte apud altitudinem eandem crescit.

Pseudobulbi approximati in rhizomate repente positi ovoideo-oblongi monophylli 1.5–3 cm. longi, usque ad 1.5 cm. lati. Folia 10–12 cm. longa, 1–2 cm. lata lineari-oblonga obtusa apice bilobula basi in petiolum pseudobulbo subaequilongum sensim angustata. Scapi usque ad 30 cm. longi foliis explanatis synanthi subrigidi vel subarcuati; racemi 15–20 cm. longi multiflori. Bracteae 3–4 mm. longae ovaria pedunculata paulo superantes patentes lanceolatae acuminatae dorso nervis crassis praeditae. Flores inter majores albidi. Sepala 7–8 mm. longa 2–3 mm. lata lanceolata acuta; dorsale paullulo angustius. Petala sepalis paulo breviora paulo latiora oblanceolata apice obtusa vel subrotundata. Labellum dilatatum trilobum circ. 7 mm. longum; lobi laterales parvi vix 1 mm. longi falcato-denticuliformes paulo supra medium positi; lobus intermedius late obovatus circ. 4.5 mm. latus apice rotundatus; carinulae tres a basi ad tres partes pererrantes, mediana minus distincta. Gynostemium circ. 5 mm. longum; stelidia lateralia fere 2 mm. supra basin gynostemii inserta, 3 mm. longa lineari-oblonga subobtusa suberecta alam apicalem gynostemii fere aequantia.

Borneo:—On Mt. Kinabalu, alt. 7200 ft. 28th Aug. 1913. Native Collector. No. 99.

On Mt. Kinabalu, alt. 13,000 ft. (?). 25th Aug. 1913. Native Collector. No. 68.

This species comes from the same locality and from approximately the same altitude as *Dendrochilum grandiflorum*, Pfitz. It differs in the larger flowers which have a labellum of quite a different shape from that of the species named. The general outline of the labellum approximates to that of *Dendrochilum longifolium*, Reichb. f., except that the apex is rounded and not pointed; cf. fig. in Engl. Pflanzenr.,—Kränz. Coelogyninae, p. 101. Among the species monographed in the above work by Kränzlin it seems to belong to the section *Dilatata*, Pfitz., in the neighbourhood of *Dendrochilum latifolium*, Lindl., and in company with *D. grandiflorum*, Pfitz.

The colour is said by the native collector to be white; in the dried state it is yellowish in tinge. This orchid is dedicated to the Ranee of Sarawak.

Gynura albicaulis, W. W. Sm. Sp. nov.

Species ex affinitate *Gynurae bicoloris*, DC. a qua foliis superioribus petiolatis nec sessilibus inter alia discrepat.

Planta herbacea (basi suffrutescens ?) 1 m. alta vel ultro parce ramosa supra sat foliosa pro maxima parte glaberrima. Rami subteretes striatuli sordide albidi. Folia basalia non visa; superiora 6–8 cm. longa, 2–3.5 cm. lata, obovata vel oblanceolata vel rarius subelliptica, apice rotundata vel subobtusa vel subacuta, apiculata, basi in petiolum ± 1 cm. longum sensim attenuata plus minusve coriacea margine integra vel remotius apiculato-denticulata apiculis utrinque 1–5, plerumque glaberrima, nonnunquam margine atque pagina inferiore sparse breviterque setosula; nervi utrinque 3–5, obscuri vel nonnunquam subtus prominuli; folia suprema medianis saepe vix minora, omnia petiolata. Inflorescentia terminalis circ. 10 cm. longa corymboso-paniculata glaberrima. Pedunculi recto angulo abeuntes 3–8 cm. longi remoti capitula solitaria vel bina (pedunculis secundariis divaricatis 2–3 cm. longis suffulta) plerumque gerentes; bracteae paucae 5–7 mm. longae subulatae. Capitula ± 1 cm. longa medio circ. 5 mm. lata. Involucri cylindracei phylla 1-seriata oblonga 7 mm. longa acuta vel subacuta marginibus late scariosa medio viridia, glabra vel sparse villosula, 1–2 subulata extus addita. Corolla tenuiter tubulosa circ. 8 mm. longa ex collectore rubrida. Achaenia oblonga 2.5 mm. longa striatula parce villosula; pappi setae corollam aequantes copiosae fragiles albae.

Borneo:—On Mt. Start (limestone), 1200 ft.; tall herb, corolla reddish, stamens yellowish. Haviland. No. 1500 in Herb. Kew.

Near Sudan, Sarawak. Native Collector. No. D2 in Herb. Edin.

Ilex Havilandii, Loesener, var. **major,** W. W. Sm. Var. nov.

Folia multo majora, 3.5–4 cm. longa, 1.5–2.5 cm. lata, coriacea obovata marginibus ± recurva utrinque nitida subtus glanduloso-punctata nervis supra impressis subtus distinctis. Inflorescentia similis ei typi.

Borneo :—Mt. Santubong, Sarawak. March 1914. Native Collector. No. D167 in Herb. Edin.

The specimens of this new variety suggest that they represent a lowland, or at any rate a less alpine, form of *Ilex Havilandii*, Loesener (*I. vacciniifolia*, Stapf). The leaves are much larger and less congested than those of the original Mt. Kinabalu plant.

Lucinaea parvifolia, W. W. Sm. Sp. nov.

Species ramulis crispato-pilosis foliis parvis capitulis paucifloris floribus pentameris conspicua.

Frutex ramosus supra suberectus basin versus semiprostratus hic illic radicans ramulis primo dense fulvo-crispato-pilosis deinde glabrescentibus. Folia stipulis brevibus ovatis petiolis 2–3 mm. longis glabris praedita, 2–3.5 cm. longa, 1–1.5 cm. lata, lanceolata vel ovato-lanceolata vel subelliptica apice acuta basi rotundata integra coriacea glaberrima supra nigrescentia infra pallidiora costa subtus paulo elevata nervis lateralibus utrinque 7–8 obscuris saepe evanidis. Capitula breviter pedunculata (2–4 mm.), plerumque solitaria terminalia 3–5-flora, cupula parva patelliformi 3–4 mm. lata bilobatula suffulta. Calycis fere 4 mm. longi tubus turbinatus, limbus annularis integer persistens, circ. 2 mm. altus. Corollae albae tubus brevis, lobi 5, 3–4 mm. longi tubo multo longiores, lineari-oblongi obtusiusculi primo erecti intus apice glabri infra dense longiuscule albo-barbati. Stamina 5 filamentis brevissimis antheris ± 1 mm. longis. Stylus filiformis fere 4 mm. longus ramis linearibus villosulis ± 1 mm. longis. Fructus maturus deest.

Borneo :—Sarawak (1865–68). Beccari. No. 3098 in Herb. Kew.

Path to Matang. Sept. 1892. Haviland. No. 678 in Herb. Kew.

Sarawak, in swampy ground. Nov. 1913. Native Collector. No. 136 in Herb. Edin.

This species is akin to *L. Pentacme*, Stapf.

Neurocalyx matangensis, W. W. Sm. Sp. nov.

Species ex affinitate *N. Gardneri*, Thw.

Planta humilis villosa. Caulis simplex plerumque 2–8 cm. vix superans in uno specimine ab Havilandio notato usque ad

1 m. evolutus, basi crassus lignosus dense fulvo-pilosus vestigiis foliorum praeteritorum stipulisque fere celatus, nonnunquam pro maxima parte subterraneus. Stipulae majusculae 1–2.5 cm. longae multifidae longiuscule strigoso-pilosae. Folia opposita, plerumque conferta subbasalia petiolo 2–3 cm. longo dense fulvido-crispato-pilosulo atque longiuscule albido-setoso suffulta, 9–24 cm. longa, 4–8 cm. lata, oblanceolata apice subrotundata breviter acuminata basi sensim attenuata vel rarius subrotundata, firme membranacea margine undulata longe setoso-ciliata supra rugosula vel bullatula atroviridia setis longis albidis atque setulis minimis fulvidis crispatis ± dense obsita infra ad costam nervosque longe albido-setosa, caetera crispato-pilosula; nervi utrinque 15–20 subparalleles leviter arcuati fere ad marginem producti ibique ascendenti-confluentes supra paulo impressi subtus ± elevati. Inflorescentiae axillares 4–8 cm. longae floribus apicem versus corymbose congestis subnutantes vel ascendentes; pedunculi, pedicelli ± 5 mm. longi, bracteae lanceolatae ± 5 mm. longae, calyces, omnes albido-setosi atque fulvo-crispato-pilosuli. Calycis tubus subglobosus 2 mm. longus fructu ad 3 mm. auctus, lobi 5 mm. longi breviter unguiculati nunc omnes subaequales lanceolati, nunc valde inaequales 2–3 ovati ampli 3–2 lanceolati vel lineari-lanceolati, membranacei reticulatim venosi. Corolla alba 5-partita ± calycem vix aequans segmentis lanceolatis. Stamina circ. 4 mm. longa antheris in tubum connatis. Ovarium biloculare; fructus maturitate alte bisulcatus coriaceus setis setulisque persistentibus, tandem in duas partes ab apice dehiscens.

Borneo :—Sarawak on sandstone rocks, alt. 2500 ft. Lobb, in Herb. Kew.

Sarawak (1865–68). Beccari. Nos. 1695, 2965 in Herb. Kew.

Sepudang; herb 3 ft., corolla white, tube short. Haviland. No. 677 in Herb. Kew.

Baram. May 1894. Haviland and Hose. No. 3412 in Herb. Kew.

Matang, 3000 ft. Haviland. No. 682 in Herb. Kew.

Matang. July 1893. Ridley. No. 11,750 in Herb. Kew.

Matang. Dec. 1913. Native Collector. Nos. 104, 244 in Herb. Edin.

Oldenlandia santubongensis, W. W. Sm. Sp. nov.

Species affinis *O. corymbosae,* Linn. sed habitu diverso rhizomate perenni longo gracili foliis floribusque majoribus recedit.

Herba perennis ± ascendens cum inflorescentia usque ad 12 cm. alta ± minute pilosula; rhizoma lignosum repens plantam rupicolam suggerit; caules angulati basi vestigiis foliorum praeteritorum crebre annulati supra ± bene evoluti nunc internodiis valde approximatis nunc subremotis foliosi. Folia 3–6.5 cm. longa, 5–7 mm. lata, plerumque approximata lineari-oblanceolata apice acuta vel longiuscule acuminata basi in petiolum fere usque ad 1 cm. longum lamina vix discretum sensim angustata, coriacea margine integra ± revoluta nonnunquam ad costam, supra viridia subscabride minute pilosula nonnunquam subglabrescentia subtus pallidiora minute pilosula vel subglabra; costa subtus paulo elevata venis primariis evanidis; stipulae breves cartilagineae persistentes. Inflorescentiae plures axillares graciles dichotome paniculato-cymosae laxae 5–15-florae minute pilosulae vel glabrescentes bracteis lineari-subulatis minutis pedicellis gracillimis ± 1 cm. longis. Calycis tubus subglobosus, dentes 4 vix 2 mm. longi ovati acuminati. Corollae infundibuliformis albae glabrae tubus circ. 4 mm. longus, lobi obtusi 2–3 mm. longi. Ovarium simile ei *O. corymbosae*, subglobosum in duos loculos dehiscens; semina vix 0.5 mm. longa angulata nigra minute granulata.

Borneo:—Lobb, in Herb. Kew. (anno 1853).

Sarawak, 3000 ft. Aug. 1884. Hullett. No. 356 in Herb. Kew.

Santubong, Sarawak, 1000 ft. Haviland, in Herb. Kew.

Santubong. July 1893. Ridley. No. 11,759 in Herb. Kew.

Santubong. 1906. Hewitt. No. 12,387 in Herb. Kew.

Matang Mt., Sarawak. Dec. 1913. Native Collector. No. E285 in Herb. Edin.

Mt. Santubong. March 1914. Native Collector. No. D182 in Herb. Edin.

The general character of the rhizome suggests a rupestral plant growing probably on the limestone of Mt. Santubong.

Pleomele sarawakensis, W. W. Sm. Sp. nov.

Species affinis *P. congestae*, N. E. Br. (*Dracaenae congestae*, Ridley).

Caulis pars suprema tantum adest lignosa cicatricibus foliorum delapsorum crebre annulata. Folia 12–30 cm. longa, 2.5–6 cm. lata lanceolata acuminata basi sensim in petiolum angustata coriacea; petioli 5–10 cm. longi robusti alte canaliculati basi lata amplexicauli praediti. Inflorescentia breviter pedunculata pedunculo vix 1–2 cm. superante, 5–15 cm. longa, simplex vel basi ramosa, floribus plurimis arcte congestis 2–4-natis, albidis. Bracteae 3–5 mm. longae ovatae vel lanceolatae scariosae. Pedicelli 2–4 mm. longi. Perianthium infundibuliforme 1.9–2.2 cm. longum, ± ad medium in lobos lineares subaequales divisum; tubus angustus basi paulo dilatatus. Stamina tubo ad basin loborum affixa filamentis gracilibus antheris 2 mm. longis. Stylus filiformis stigmate capitato. Bacca deest.

Borneo:—Kuching, Sarawak. Feb. 1893. Haviland. No. 3126 in Herb. Kew.

Mt. Santubong, Sarawak. March 1914. Native Collector. No. D161 in Herb. Edin.

This new species has a very dense spiciform panicle and is akin to *Pleomele congesta*, N. E. Br. of the Malay Peninsula. The latter grows in limestone districts, and *P. sarawakensis* is probably from similar formations on Mt. Santubong. The specimens from this last locality are more slender and have slightly smaller flowers than Haviland's specimen, but I take them to be the same species.

Randia kuchingensis, W. W. Sm. Sp. nov.

Species affinis *R. longiflorae,* Lam. sed calyce ferrugineo-piloso et corolla majore inter alia discrepans.

Arbor parva ramis ramulisque exarmatis teretibus striatulis primo ± dense ferrugineo-pilosis deinde glabrescentibus; stipulae trigonae acuminatae 2–3 mm. longae ferrugineae. Folia petiolo vix 2–3 mm. superante ferrugineo-pilosulo praedita 10–22 cm. longa, 5–9 cm. lata, elliptica vel obovata vel late oblanceolata apice rotundata vel subobtusa vel breviter abrupte acuminata basi late cuneata vel rotundata integra coriacea supra saepius nitida glabra vel subglabra costa nervisque ferrugineo-pilosulis exceptis, subtus tomento minuto fulvido ± dense velata costa nervisque dense ferrugineo-pilosulis; nervi laterales utrinque 7–11 supra plerumque impressi infra ± eminentes. Corymbi contracti subsessiles axillares vulgo 3–4-flori erecti pedicellis 4–8 mm. longis ferrugineo-pilosulis, bracteis stipulis subsimilibus. Calycis dense ferrugineo-pilosi tubus 7–9 mm. longus, dentes 7–9 mm. longi lineares. Corollae albae fragrantis tubus usque ad 5.5 cm. longus, in sicco complanatus 3 mm. latus, extus dense fulvido-pilosulus intus sparse, lobi patentes 2–2.5 cm. longi elliptici subacuti vel obtusi. Antherae sessiles 1.3 cm. longae. Stylus tubum aequans supra pilosulus infra glaber. Bacca ovoidea usque ad 5 cm. longa, 3 cm. lata, 2-locularis, seminibus 16 in quoque loculo, complanatis pulpa immersis.

Borneo:—Sarawak, Penrissu road, 2nd mile. 1884. Haviland. No. 676 in Herb. Kew.

Near Kuching. Dec. 1892. Haviland (under No. =676), in Herb. Kew.; April 1893. Haviland. Without number in Herb. Kew.

Niak (*sic* ?). May 1892. Haviland and Hose, in Herb. Kew.

Sarawak, in swampy ground. Nov. 1913. Native Collector. No. 74 in Herb. Edin.

Sarawak, 9th mile, Matang road, flower white. April 1914. Native Collector. No. C226 in Herb. Edin.

Timonius Esherianus, W. W. Sm. Sp. nov.

Species ex affinitate *T. stipulosi* (Scheff.) Val. qui calycis segmentis permagnis appressis inter alia differt.

Arbuscula 5–6 m. alta; ramuli subtetragoni rigidi crassiusculi primo densissime ferrugineo-villosi; stipulae ± 1 cm. longae deciduae ovatae acuminatae, ut innovationes densissime ferrugineo-villosi. Folia (superiora tantum visa) 8–14 cm. longa, 5–8 cm. lata, late obovata vel late elliptica, apice lata breviter vel vix acuminata basi late cuneata, coriacea supra primo atroviridia ± dense longiuscule ferrugineo-setosa tandem fusca subglabrescentia rugosula furfuraceo-subscabridula subtus primo densissime ferrugineo-tomentoso-setosa deinde vix parcius; nervi laterales utrinque ± 8 supra impressi distincti primo densissime ferrugineo-setosi tandem glabri subtus prominentes maturitate densissime ferrugineo-setosi, prope marginem adscendentes atque confluentes, venulis distinctis reticulati; petioli 1 cm. longi vel minores crassi ferrugineo-setosi. Inflorescentiae forma ignota, floribus omnibus sejunctis; flores tetrameri pedicellis 5–6 mm. longis setosulis suffulti; bracteolae binae sub ovario positae 8–12 mm. longae ovarium fere maturum paulo superantes vel aequantes, lineares dense ferrugineo-setosulae. Calycis dense ferrugineo-setulosi tubus 2 mm. longus 3 mm. diametro, dentes ± 5 mm. longi lineari-lanceolati acuti. Corollae extus dense fulvido-sericeae tubus circ. 7 mm. longus anguste infundibularis ad faucem paulo dilatatus, lobi circ. 3 mm. longi lineari-oblongi extus dense sericei apice ferruginei. Ovarium fere maturum globosum vix sulcatum ± 1 cm. diametro calyce persistente coronatum densissime ferrugineo-setosulum sarcocarpio magno; pyrenae verticales ± 12, subregulariter cruciatim dispositae, aream 2 mm. diametro occupantes ellipsoideae.

Borneo:—On Mt. Santubong, Sarawak. March 1914. Native Collector. No. 200.

A very beautiful species; the leaves have a fine covering of persistent ferruginous setae, which are also found on the calyx and ovary. There is in the type specimen only one corolla, which I have not dissected. The species nearest akin is *T. stipulosus* (Scheff.), Val., figured in Icones Bogorienses, tab. ccxcix. Compare also Valeton's *clavis analyticus* in Bull. Dép. Agric. Ind. Néerl., xxvi (1909), 27. The specific name is in honour of the Right Hon. Viscount Esher, under whose sympathetic administration as Secretary of H.M. Office of Works, rejuvenescence of the Royal Botanic Garden, Edinburgh, took place, and by whose kind mediation this and other Bornean plants were secured for the Garden.

Tristania Moultoniana, W. W. Sm. Sp. nov.

Species ab omnibus speciebus malayicis ob flores maximos valde diversa; habitu foliisque ad *T. ellipticam*, Stapf. appropinquat.

Arbor vel frutex. Ramuli crassiusculi hic illic complanati glabri pallido-brunnei; gemmae terminales subulato-lineares usque ad 6 cm. longae. Folia omnia alterna remota, nusquam approximata, petiolo brevissimo vix a lamina discreto vix 1–2 mm. superante suffulta, oblanceolata vel anguste obovata vel subelliptica, 10–20 cm. longa, 3–6 cm. lata, basi cuneata apice rotundata vel obtusa, coriacea glaberrima utrinque sublucida, costa supra paullulo impressa subtus vix prominente, nervis lateralibus infra distinctioribus utrinque ± 30 parallelis rectis 3–4 mm. a margine cum nervo marginali junctis venulis siccitate infra distincte reticulantibus. Inflorescentiae in axillis foliorum superiorum orientes ± 6-florae umbelliformes glabrae; pedunculi 4–5 cm. longi multo complanati; ramuli divaricati; pedicelli 1–1.5 cm. longi multo complanati; bracteae non visae. Calycis coriacei glabri tubus depresso-turbinatus circ. 4 mm. longus, dentibus subquadratis circ. 2 mm. longis apice rotundatis. Petala obovata vel elliptica 1.3–1.5 cm. longa, 6–9 mm. lata glandulis punctata. Stamina perplurima paulo exserta in phalanges 5 petalis oppositas connata filamentis pro maxima parte liberis antheris versatilibus. Ovarium semisuperum 3-loculare globosum glabrum stylo brevi filiformi. Fructus deest.

Borneo:—In the neighbourhood of Sarawak, in swampy country. 21st Nov. 1913. Native Collector. No. 172.

A species very distinct from all the described species of *Tristania* from Indo-Malaya. Only the Australian species approach it in size of flower. Its nearest ally in Malaya is undoubtedly *T. elliptica*, Stapf. (Beccari No. 2244, collected in Sarawak and undescribed according to Stapf in Trans. Linn. Soc., 2nd ser., iv (1894), 152, is a different species with much smaller flowers.) The colour of the flower is given by the collector as red: this may refer to the stamens; in the dry state the tint of the corolla is yellowish. In the specific name opportunity is given for recording the work done by J. C. Moulton, Esq., Curator of the Sarawak Museum, in superintending the collection of these Bornean species.

Vaccinium borneënse, W. W. Sm. Sp. nov.

Species affinis *V. acuminatissimo,* Miq. a quo inflorescentia contracta subglobosa bracteis ovatis pedicellis brevissimis vel nullis calycis lobis majoribus inter alia recedit.

Rami mediocres teretes cortice atrobrunneo tecti crebre lenticellati. Folia 10–15 cm. longa 3–4.5 cm. lata elliptica vel elliptico-lanceolata acuta mediocriter acuminata basi ± late cuneata vel subrotundata coriacea integerrima supra lucida glabra infra pallidiora lucida costā nervisque breviter pilosula caeterum glabra vel subglabra, 5-nervia; nervi e basi ipsa orti, intermedii tres intramarginalibus multo distinctiores supra impressi subtus multo elevati nervulis transversis crebris distinctis bene reticulatis; petioli 2–3 mm. longi pilosuli. Inflorescentiae axillares multo contractae in fructu 1.5–2 cm. longae ovoideae vel subglobosae; pedunculi bracteis ovariisque celati dense pilosuli; pedicelli nulli vel fere nulli; bracteae bracteolaeque ovatae 1.5–2 mm. longae dense fulvo-pilosulae multicostulatae, sub ovario ipso arcte positae. Calycis tubus subglobosus, in fructu semimaturo 3–4 mm. diametro, dense fulvo- vel subrufo-pilosulus, dentibus 5 ovatis vel ovato-lanceolatis circ. 2 mm. longis obtusiusculis multicostulatis subcoriaceis ± pilosulis persistentibus conniventibus. Corolla staminaque non visa. Baccae ± 20-spermae.

Borneo:—Sarawak in swampy country. Nov. 1913. Native Collector. No. 66 in Herb. Edin.

This new species is a close relative of *V. acuminatissimum,* Miq., with very similar leaves, but with a very characteristic inflorescence which is so contracted as to be quite subglobose, while the pedicels are scarcely distinguishable. It is possible, however, that *Vaccinium acuminatissimum,* Miq., forma *borneënsis,* Miq., in Ann. Mus. Bot. Lug.-Bat. I (1863), 36, may be the same as this new species. I have not seen Korthals' original; the Malayan material of *V. acuminatissimum* at Kew and at Edinburgh shows nothing matching the Sarawak plant.

SPECIES CHINENSES.

Acer oblongum, Wall., var. **biauritum,** W. W. Sm. Var. nov.

Folia parte superiore trilobata lobis lateralibus terminali plerumque multo minoribus nonnunquam subaequantibus, plerumque 4.5–6 cm. longa, 4–5.5 cm. lata, paulo longiora quam latiora.

"Shrub of 25–35 ft. In fruit. In open thickets in side valleys on the mountains of the Chungtien plateau. Lat. 27° 55′ N. Alt. 10,000 ft. July 1913." G. Forrest. No. 10,644.

This variety of *A. oblongum* occurs in the same area as a plant with normal foliage (Forrest, No. 10,669). The leaves are nearly always trilobate, though occasionally a leaf is found indistinguishable from the leaf of *A. oblongum*, and are moreover nearly as broad as long. No. 10,669 differs from typical *A. oblongum* in the wings of the fruit being horizontal, and may be equivalent to var. *horizontale*, Pax, previously recorded only as a cultivated plant in the Botanic Garden of Florence (Pflanzenreich-Aceraceae, p. 31).

3 **Adenophora Forrestii,** Diels, var. **minor,** W. W. Sm. Var. nov.

Planta a typo habitu graciliore foliis integerrimis flore solitario multo minore (1 cm. longo) stylo exserto ita recedit ut fortasse pro specie propria haberi possit; speciminibus in herbario paucis, cum *A. Forrestii* interim est conjuncta.

China:—Western Yunnan, near A-tun-tsi, on screes at 13,000 ft. F. Kingdon Ward. No. 1077.

154 **Agapetes Wardii,** W. W. Sm. Sp. nov.

Species affinis *A. buxifoliae*, Nutt. sed foliis lanceolatis vel oblanceolatis integerrimis calyce glabro inter alia differt.

Frutex epiphyticus gracilis; ramuli subteretes setis adpressis nigridis densissime vestiti. Folia vix petiolata, ± 2 cm. longa, 6–7 mm. lata, lanceolata vel oblanceolata apice acuta vel subacuminata basi anguste cuneata integerrima coriacea glabra supra viridia nitentia subtus pallidiora opaca, nervis supra distinctis infra obscurioribus, costa supra elevata infra evanida. Flores axillares solitarii vel bini vel 3–5-nati ramulos terminantes; pedunculi vix evoluti; pedicelli 7–9 mm. longi glabri bracteolis duabus circ. 1 mm. longis subulatis basi praediti. Calyx tubuloso-campanulatus rubridus glaber vix ad medium fissus; lobi quinque lanceolati vel anguste triangulares acuti erecti. Corolla circ. 1.5 cm. longa, 3–4 mm. lata, anguste tubulosa, rubra, glabra setulis paucis apicem versus exceptis, in lobos circ. 1.5 mm. longos triangulares obtusiusculos flavescentes breviter fissa. Stamina 10, circ. 1 cm. longa, filamentis 5 mm. longis glabris antheris elongatis, cum tubulis 5 mm. longis, calcaribus nullis. Stylus filiformis stamina paulo superans. Fructus deest.

Upper Burma:—"In the Kachin Hills, 7000–8000 ft. Small bushy undershrub growing on dry boulders or on trees. March 1914." Coll. F. Kingdon Ward. No. 200.

The collector notes that he came across the same plant in the Salween Valley, West Yunnan. This slender species is nearly related to *A. buxifolius*, Wall., and to *A. yunnanensis*, Franch.

Androsace Graceae, G. Forrest. Sp. nov.

Species nana foliis pro magnitudine longe petiolatis reniformibus integerrimis bracteis ovalibus obtusissimis inter congeneres conspicua.

Planta minima cum scapo vix 4 cm. superans plus minusve caespitosa. Folia omnia radicalia ± 6, petiolo usque ad 2 cm. longo pilis multicellularibus albidis vel fulvis subdense velato suffulta ± 9 mm. longa, ± 11 mm. lata reniformia apice rotundata basi breviter cordatula carnosula integerrima supra atroviridia glabra vel subglabra infra subpurpurascentia pilis multicellularibus albidis vel fulvis conspersa nervis evanidis. Scapi 1–2, circ. 4 cm. alti erecti rigidiusculi pilis multicellularibus ± dense velati, ± 6-flori. Bracteae ± 6, circ. 3 mm. longae, ± 2 mm. latae, carnosulae late ovalia obtusissima extus ± pilosae; pedicelli 3–4 mm. longi flexiles ± pilosi. Calyx campanulatus circ. 3 mm. longus ad medium vel paulo ultro partitus extus sparse pilosus; lobi 5–6 ovati obtusi. Corollae roseae tubus calycem subaequans; lobi circ. 2 mm. longi anguste obovati. Capsula calyce brevior depresso-globosa valvis 5–6 dehiscens.

"Plant of 1–2 inches. Flowers rose. Open stony pasture on the Kari Pass, Mekong-Yangtze divide, Yunnan, Western China. Lat. 27° 40′ N. Alt. 14,000 ft. July 1914." G. Forrest. No. 13,010.

A very distinct species; it is distinguished from all the known species of the section *Pseudoprimula*, Pax, by its *entire* reniform leaves; from all those of the section *Chamaejasme*, Koch, by the long petioles (except from *A. mirabilis*, Franch., which is a tall robust species). The foliage recalls that of *Polygonum nummularifolium*, Meissn. The plant is dedicated to a sister of the collector.

Anthriscus yunnanensis, W. W. Sm. Sp. nov.

Species ob radicem tuberosam pro planta maximam conspicua.

Herba altitudine variabilis, nunc nana 10–20 cm. nunc usque ad 45–60 cm. alta. Radix tuberosa 5–10 cm. longa. Caulis erectus striatus glaber. Folia radicalia petiolo basi longe vaginante circ. 8 cm. longo praedita, caulina petiolo excluso vaginae insidentia; vaginae extus striatae albo-villosae, annulum villosum circa caulem formantes; in plantis minoribus annulo inconspicuo vaginae saepe fere glabrae; lamina 3–4-pinnatim decomposita segmentis ultimis pinnato-lobatis, 8–16 cm. longa, in utraque facie sparse albo-hirsutula; facies foliorum similis ei *Anthrisci vulgaris*, Bernh. Involucri phylla 0; umbellae radii 4–8 subaequales 1–2 cm. longi. Involucelli phylla 5–6, lanceolata acuminata 6–7 mm. longa umbellulam vix aequantia viridia margine albo-villosula vel subglabra; umbellulae 6–10-florae pedicellis circ. 6 mm. longis. Calycis dentes obsoleti. Petala oblonga vel obovata 2–3 mm. longa, alba. Ovarium circ. 2 mm. longum, oblongum, glabrum. Fructus maturus deest.

"Plant of 4–8 inches. Flowers white. Open stony pasture on the eastern flank of the Lichiang Range. Lat. 27° 20′ N. Alt. 10,000–11,000 ft. July 1910." G. Forrest. No. 6020.

"Plant of 1½–2 ft. Flowers white. Mountain pasture on the margins of pine forests on the eastern flank of the Lichiang Range. Lat. 27° 30′ N. Alt. 11,000 ft. June 1910." G. Forrest. No. 5914.

Aster pycnophyllus, Franch. mss. in Herb. Paris. ex Diels in Notes Roy. Bot. Gard., Edin., vii (1913), 340. Ex speciminibus Forrestianis tantum descr. W. W. Sm.

Species ex affinitate *A. trinervii*, Roxb.

Planta 30–60 cm. alta, erecta, rhizomate longo reptante praedita. Caulis flexuosus teres infra subnudus, medio foliosus glabrescens ruber, supra ± dense villosulus, simplex nisi in regione inflorescentiae. Folia petiolata petiolo 1–2 cm. longo; lamina usque ad 7 cm. longa, 3–4 cm. lata, ovata vel ovato-lanceolata, apice longiuscule caudato-acuminata, basi rotundata, repando-dentata dentibus indurato-apiculatis, supra olivaceo-viridis minute setosula, marginibus densius, vix scabridula, infra cinereo-setosula, nervis supra obscuris infra eminentibus bene reticulatis. Inflorescentia paniculato-corymbosa, ampla, ramulis plurimis dense albido-villosulis, foliis bracteiformibus multis 1–2 cm. longis linearibus vel lineari-lanceolatis praedita; pedunculi ultimi circ. 1 cm. longi. Capitulum cum ligulis in sicco circ. 1 cm. diametro 30–40-florum; involucri phylla pauciseriata, circ. 4 mm. longa, linearia, apice aristato-apiculata, extus crispato-villosula intus glabra. Flores radiati circ. 20; tubus corollae 2 mm. longus, ligulae patulae circ. 5 mm. longae lineares laete purpureo-coeruleae, pappus 3 mm. longus albidus; in floribus disci corolla aurantiaca 4–5 mm. longa. Ovarium obovatum 1 mm. longum parce pilosulum.

"Plant of 1½–2 ft. Ray florets bright purplish blue, disc florets orange-yellow. Shady ledges of cliffs in side valleys on the eastern flank of the Tali Range, Yunnan. Lat. 25° 40′ N. Alt. 10,000–11,000 ft. Sept. 1906." G. Forrest. No. 4001.

Betula Delavayi, Franch., var. **Forrestii,** W. W. Sm. Var. nov.

Magnitudine, foliis majoribus, ad 4.5 cm. longis, ad 3 cm. latis, ovatis nec lanceolatis, apice obtusis vel subrotundatis nec acutis, supra longe sericeo-pilosis, inflorescentiis fructiferis ad 3 cm. longis a typo recedit.

"Tree of 25–40 ft. Open situations in pine forests on the eastern flank of the Lichiang Range. Lat. 27° 10′ N. Alt. 10,000 ft. May 1910." G. Forrest. No. 5546.

Betula Delavayi, Franch., var. **calcicola**, W. W. Sm. Var. nov.

Planta nana, 30–45 cm. alta, ramulis novellis densissime incano-tomentosis: folia 1–2 cm. longa, 1–1.5 cm. lata, ovata vel fere orbicularia vel oblonga, apice rotundata vel obtusa.

"Dwarf shrub of 1–1½ ft. In the crevices of limestone cliffs on the eastern flank of the Lichiang Range. Lat. 27° 20′ N. Alt. 11,000–12,000 ft. June 1910." G. Forrest. No. 5835.

I take Delavay's plant to be intermediate between the two varieties. Forrest No. 5546 is a tree; Delavay No. 3725 is a shrub; Forrest No. 5835 is a dwarf shrub. The leaves of the series differ much in size and in shape, but are much alike in consistency, in the arrangement of the lateral veins, and in the silky hairs which are specially prominent on the under side of the veins. The bracts and nutlets are very similar.

Boottia echinata, W. W. Sm. Sp. nov.

Species spathâ tubulosâ echinatâ conspicua.

Rhizoma atque folia ignota. Scapi longissimi, usque ad 100 cm. vel ultra, gracillimi. Spatha ♂ late tubulosa, 4–5 cm. longa, apice irregulariter dentata, dentibus circ. 8, duobus circ. 2 cm. longis, longe acuminatis, plus minusve echinatis, 5–6 multo brevioribus; tubus subangulatus, ut summus scapus sparse echinatus. Flores ♂ in quaque spatha ± 12, exserti, pedicellis circ. 6 cm. longis, nunc glabris, nunc plus minusve dense echinatis. Sepala 3, lineari-lanceolata, 12–18 mm. longa, obtusa, viridia. Petala 3, late elliptica, 15–20 mm. longa, circ. 10 mm. lata, aurantiaco-flava. Stamina 12, subaequalia, circ. 6 mm. longa, filamentis 3–4 mm. longis multo complanatis; stylodia 3 massam oblongam formantia, bifida. Flores ♀ ignoti.

"Floating plant of 3–9 ft. Flowers orange-yellow. Shallow bays on the western shores of Lake Er-hai, Tali Valley. Lat. 25° 40′ N. Alt. 6500 ft. Nov. 1910." G. Forrest. No. 7376.

Crepis setigera, Scott. Sp. nov.

Species caule petiolis costis pedunculis densissime purpureo-setosis facile recognoscitur.

Herba setosa 15–18 cm. alta. Rhizoma breviter cylindricum crassum lignosum, 4–6 cm. longum. Caulis erectus vel suberectus, apice subcernuus, striatus, setis patentibus purpureis dense indutus. Folia fere omnia radicalia 7–10 cm. longa, 2–3 cm. lata, ambitu oblanceolata grosse et irregulariter dentata dentibus indurato-apiculatis, basi cuneata, apice acuta vel acuminata, supra glauco-viridia infra pallidiora, costa utraque facie conspicua setis longis purpureis dense velata, venis supra sparse setosis infra paulo elevatis setosioribus; petiolus 1–3 cm. longus densissime purpureo-setosus; folia caulina pauca 1–3 breviora fere sessilia ceterum radicalibus subsimilia, suprema fere linearia. Capitula 10–15 paniculam congestam formantia, 1–1.5 cm. longa, 0.5–1 cm. lata, pedunculis fusco-purpureo-setosis 0.25–1 cm. longis suffulta; bracteae 2–3 mm. longae lineares vel lineari-lanceolatae, dense setosae. Involucri phylla libera, 1 cm. longa, lanceolata, medio longe setosa, viridia, margine paullulo scariosa. Flores flavi paulo involucri phyllis longiores, circ. 1.3–1.4 cm. longi. Achenia 5–5.5 mm. longa, erostrata longitudinaliter costata albido-fusca glaberrima, pappo simplice fusco achenia ± aequante.

China:—West Szechwan. "Perennial composite; stems red tomentose, flowers yellow; mountain pastures at Tcha-ho. Alt. 2600 m. July 1913." E. E. Maire. Nos. 72, 197 (1914).

Didissandra Agnesiae, G. Forrest.

Species pulchra foliis ovatis dense cinereo-adpresso-strigosis, scapis pilis atratis septatis glanduloso-capitatis indutis, corolla magna circ. 4.5 cm. longa valde ventricosa lobis acutis praedita inter congeneres conspicua.

Herba acaulis. Folia 6 rosulata, petiolo 1–2 cm. longo complanato dense fulvo-hirsuto praedita, 3–4 cm. longa, 1.5–2 cm. lata, ovata apice obtusa vel subobtusa basi sensim in petiolum angustata in dimidio apicali serrata subcoriacea supra dense cinereo-adpresso-strigosa infra dense fulvido-adpresso-strigosa; nervi supra obscuri subtus distincti 3–4-jugi. Scapi 1–2, 10 cm. alti, uniflori pilis atratis septatis glanduloso-capitatis undique densius induti; bracteae duae supra medium scapum insertae ± patentes circ. 5 mm. longae lineares strigosae. Flores pro genere magni (kermesini). Calyx 7–8 mm. longus extus pilosus intus glaber in lobos quinque sublineares vel lineari-lanceolatos acuminatos fere ad basin partitus. Corolla 4.5 cm. longa, medio 2.5 cm. lata (in sicco), ventricosa, extus sparsim pilis atratis septatis glanduloso-capitatis praedita tubo fere 3 cm. longo, ore multum obliquo lobis inaequalibus acutis duobus superioribus ± 1 cm. longis inferioribus tribus ± 1.5 cm. longis. Stamina 4 inclusa basi corollae affixa filamentis paulo dilatatis sparse pilosulis antheris per paria connatis. Ovarium sparse pilosulum. Capsula nondum matura circ. 2.5 cm. longa lineari-oblonga.

"Plant of 2–4 inches. Flowers deep crimson. Open dry situations on rocks and cliffs on the Yung-peh Mountains, Yunnan, Western China. Lat. 26° 40′ N. Alt. 9000–10,000 ft. July 1914." G. Forrest. No. 12,829.

Eria obvia, W. W. Sm. Sp. nov.

Species ex affinitate *E. bractescentis*, Lindl.; bracteis angustis ovaria subaequantibus, sepalis petalisque multo angustioribus, labello minimo tantum 2 mm. lato inter alia recedit.

Pseudodulbi aggregati anguste cylindracei, apice attenuati, saepius curvuli, 8–12 cm. longi, 2–2.5 cm. crassi, plerumque triphylli. Folia usque ad 25 cm. longa, 2–2.5 cm. lata, anguste lanceolata, acuta, basi cuneata, subcoriacea. Racemi 1–2, ex axillis foliorum orientes, foliis paululo breviores, plerumque 15–18 cm. longi, graciles, laxiflori, 20–30-flori; bracteae 6–10 mm. longae, circ. 2 mm. latae, lineari-lanceolatae acutae vel acuminatae, multo reflexae saepe rhachidi subadpressae, albidae vel pallido-luteae, glabrae; sub inflorescentia bracteae 1–3 inanes pedunculo brevi insidentes; rhachis minute albovillosula; pedicelli ± 1 cm. longi bracteas subaequantes vel paulo majores minute villosuli. Flores in vivo circ. 1 cm. diametro, resupinati, glabri, albi, odore cinnamomi tenui fragrantes. Sepalum dorsale 10–11 mm. longum, 2 mm. latum, anguste lanceolatum acutum erectum vel paululo inflexum, sepala lateralia circ. 8 mm. longa, 3 mm. lata, valde falcata, subacuta vel acuta, mentum circ. 3 mm. longum obtusum formantia. Petala circ. 8 mm. longa, 1 mm. lata, caeterum sepalo dorsali subsimilia. Labellum basi oblonga vix 2 mm. longa praeditum, lobi laterales auriculiformes vix 1 mm. superantes erecti margine purpureo-suffusi, intermedius late ovatus obtusus, usque ad mentum ipsum reflexus, circ. 3 mm. longus, 2 mm. latus, carnosulus, viridi-flavidus, lamellis tribus fere per totum discum percurrentibus mediana paulo indistincta. Anthera mitraeformis apice purpureo-tincta polliniis 8 pyriformibus.

"Dry open rocky situations on the lava-bed west of Tengyueh, Yunnan. Lat. 25° N. Alt. 4500 ft." Plants collected in 1912 by George Forrest, flowered in the Royal Botanic Garden, Edinburgh, in July 1914.

Of the species of *Eria* known from the Indo-Chinese region *E. obvia* appears to come nearest *E. bractescens*, Lindl., but differs especially in the bracts, petals, and labellum from descriptions of that species. Cf. the figure and description of Himalayan specimens of *E. bractescens* by King and Pantling in Ann. Bot.

Gard., Calc., viii, 120, t. 166; and Kränzlin in Pflanzenreich—Orchidaceae-Monandrae-Dendrobiinae, part ii, 88. The plant has flowered freely with graceful racemes of white flowers which are by no means fugacious (King and Pantling note that Himalayan plants of *Eria bractescens* do not survive more than two days). The blooms have a faint odour of cinnamon. The empty bracts below the inflorescence are not conspicuous as in *E. bractescens*, as they are more or less concealed by the sheathing leaf.

Eriolaena yunnanensis, W. W. Sm. Sp. nov.

Species ex affinitate *E. Candollei*, Wall. a qua foliis integris supra fere glabris fructibus minoribus inter alia differt.

Arbor 10–18 m. alta ramulis crassis primo ± stellato-tomentosis mox glabrescentibus. Folia 5–10 cm. longa 3–5 cm. lata oblonga vel ovato-oblonga apice subacuta vel breviter acuminata basi rotundata vel brevissime cordatula coriacea integra vel margine paullulo sinuata supra (matura tantum visa) subglabra (juniora probabiliter ± stellato-tomentosa) subtus dense ferrugineo-stellato-tomentosa; nervi basi 5 palmatim orientes, duo exteriores breves, medius aliis multo major secundarios 3–4 utrinque gignens, omnes supra impressi subtus eminentes; petioli 1–2 cm. longi ± stellato-tomentosi. Pedunculi pluriflori. Flores desunt. Capsula 2.5–3 cm. longa circ. 2 cm. lata ovoidea lignosa 10-lobatula 10-valvata loculicide dehiscens extus ferrugineo-stellato-furfuracea; semina (alis exceptis) 8 mm. longa 4–5 mm. lata ovoidea compressiuscula; alae 1.2–1.5 cm. longae, 4–6 mm. latae brunneae.

"Tree of 20–40 ft. Open situations in mixed forest on the slopes of the Shweli Valley on the Teng Yueh-Talifu road, Yunnan. Alt. 6000–7000 ft. September 1905." G. Forrest. No. 809.

"Tree of 30–50 ft. In fruit. In forests on the divide between the Shweli and Yengyueh Valleys, Yunnan. Lat. 25° N. Alt. 7000 ft. May 1912." G. Forrest. No. 7893.

Forrest collected this plant twice—with an interval of nearly seven years—but did not succeed in obtaining flowers. It is so distinct from the *Eriolaenae* of India and Burma that I have no hesitation in describing it from the foliage and fruits—apparently the first species of this genus definitely recorded from China. Henry, however, collected near Szemao (No. 12,506A in Herb. Edin.) an allied species in fruit with larger deeply cordate leaves which so far has not received a name.

Herminium Souliei, Rolfe, var. **lichiangense,** W. W. Sm. Var. nov.

Foliis floribusque typo multo major. Planta ad 30 cm. alta. Folia 2–3, oblonga, ad 12 cm. longa, ad 2 cm. lata, obtusa. Spica ad 15 cm. longa. Flores eis typi simillimi sed omnibus partibus majores.

"Plant of 9–12 inches. Flowers green. Open stony pasture on the eastern flank of the Lichiang Range. Lat. 27° 35′ N. Alt. 11,000 ft. Aug. 1910." G. Forrest. No. 6399.

A very much robuster plant than Forrest No. 4864 from the Tali Range. On dissection and comparison of the flowers I find no difference except in size.

459 **Impatiens clavicuspis,** Hook. f., nomen tantum in Herb. Kew. et Herb. Edin. descr. W. W. Sm.

Species inter *I. aquatilem*, Hook. f. et *I. radiatam*, Hook. f. in Herbario Kewensi a claro Hookero f. sub numero 37 apud species chinenses posita.

Herba 30–60 cm. alta erecta substricta, setulis glanduligeris paucis exceptis glabra, caule parce ramoso gracili basi longe nudo superne folioso. Folia 7–9 cm. longa, 2–3.5 cm. lata, petiolo 1–2 cm. longo gracili praedita, alterna tenuiter chartacea ovato-lanceolata vel lanceolata longiuscule acuminata basi ± late cuneata, regulariter crenato-serrata setulis inter crenaturas interjectis, subtus pallida nervis utrinque 6–8 obscuris. Pedunculi axillis superioribus orientes foliis paulo longiores erecti graciles 10–12-flori basi longe nudi; pedicelli 1–1.5 cm. longi, fructiferi paulo elongati; bracteae 6–8 mm. longae, ovatae in aristam glanduligeram laminae subaequalem productae subpersistentes. Flores majusculi pallido-lutei apice purpureo-tincti vel pallido-purpurei basi luteo-albidi. Sepala 2, oblique ovato-rotundata 4–5 mm. diametro in aristam glanduligeram circ. 2 mm. longam acuminata, membranacea multinervia. Vexillum suborbiculare circ. 1 cm. diametro costa distincta apiculata. Alae 3 cm. longae; lobus basalis subrotundatus circ. 1 cm. diametro; distalis duplo longior a basi paulo dilatata sensim angustatus. Labellum saccatum circ. 2 cm. longum (calcare excluso), basi in calcar 1 cm. longum vel paulo ultro incurvum attenuatum, ore horizontali 1.6–1.7 cm. lato apiculato. Filamenta late linearia antheris ovatis. Ovarium lineare rectum acutum. Capsulae 2.5 cm. longae lineares vix stipitatae acutae oligospermae. Semina semimatura circ. 2 mm. longa breviter fusiformia.

"Plant of 1–2 ft. Flowers pale yellow, tips of corolla purple. Shady moist situations on the divide between the Mekong and Yung Chang Valleys on the Teng Yueh-Talifu road. Lat. 25° 10′ N. Alt. 8000–9000 ft. West Yunnan. Sept. 1905." G. Forrest. No. 1004.

"Plant of 1–2 feet. Flowers purple (pale) shading to yellowish white at base of corolla. Damp shady places on the Ming-Kwong-Irrawadi divide. Lat. 26° N. Alt. 7000–8000 ft. Oct. 1905. Upper Burma and N.W. Yunnan." G. Forrest. No. 1006.

"Yunnan, Mengtze, 5500 ft., yellow flowers." Henry. No. 9762 in Herb. Kew.

"Yunnanfu; fl. jaunes." Ducloux. No. 432 in Herb. Kew. (This is probably the same.)

159 **Impatiens cyclosepala,** Hook. f. nomen tantum in Herb. Kew. et Herb. Edin. descr. W. W. Sm.

Species ante *I. Davidi*, Franch. in Herbario Kewensi a claro Hookero f. sub numero 81 in serie specierum chinensium posita.

Herba 30–60 cm. alta erecta primo crispato-setosula mox subglabrescens caule supra parce ramoso vix robusto basi longe nudo superne folioso. Folia 7–9 cm. longa 2.5–3.5 cm. lata, petiolo 1–2 cm. longo primo ± dense fulvo-crispato-setosulo praedita, alterna charactea ovato-lanceolata longiuscule acuminata basi ± late cuneata, regulariter serrata serraturis glanduloso-apiculatis, supra scabridiuscule setosula, infra subglauca vel apud costam setosula nervis utrinque 5–7. Pedunculi axillis superioribus orientes foliis multo breviores erecti vel suberecti 1–3-flori; pedicelli 1–2 cm. longi; bracteae circ. 3 mm. longae late ovatae breviter obtuse apiculatae. Flores majusculi flavidi perpaululum purpureo-tincti. Sepala 2, orbicularia 8–10 mm. diametro brevissime glanduloso-apiculata membranacea reticulato-nervosa. Vexillum suborbiculare circ. 1.5 cm. diametro, costa in medio cornuto-carinata. Alae circ. 2.5 cm. longae, sessiles; lobus basalis subrotundatus circ. 1 cm. diametro; distalis paulo longior late obovatus. Labellum late saccatum circ. 2 cm. longum (calcare excluso), medio 1 cm. latum, basi in calcar 4–5 mm. longum multo incurvum abrupte attenuatum ore 1.4 cm. lato paulo ascendente apiculato. Filamenta 4–5 mm. longa antheris apice acutatis. Ovarium lineare acutum. Capsula matura deest.

"Plant of 1–2 ft. Flowers yellowish, faintly marked light purple. Moist open situations in side valleys on the eastern flank of the Tali Range, West Yunnan. Lat. 25° 40′ N. Alt. 8000–9000 ft. June 1906." G. Forrest. No. 4271.

Impatiens Forrestii, Hook. f. nomen tantum in Herb. Kew. et Herb. Edin. descr. W. W. Sm.

Species ante *I. cyclosepalam*, Hook. f. et *I. Davidi*, Franch. in Herbario Kewensi a claro Hookero f. sub numero 80 in serie specierum chinensium posita.

Herba 30–90 cm. alta erecta caule subsimplici vel paulo ramoso gracili basi longe nudo superne folioso glabro vel supra setis raris consperso. Folia magna usque ad 15 cm. longa, ad 5 cm. lata, petiolo 1–2 cm. longo glabro praedita, alterna, exsiccata membranacea, ovato-lanceolata vel subelliptica acuminata basi ± late cuneata regulariter serrata serraturis magnis glanduloso-apiculatis supra hic illic setosula infra glaucescentia sparse minute setosula nervis utrinque 8–9. Pedunculi axillis superioribus orientes folia aequantes vel paulo breviores suberecti vel paulo deflexi flexuosi graciles 2–3-flori ; pedicelli 1–2 cm. longi glabri ; bracteae 3–4 mm. longae ovato-lanceolatae glanduloso-apiculatae costa distincta nigrida nonnunquam setosula praeditae. Flores magni roseo-purpurei saturatius maculati et striati. Sepala 2, oblique late ovata fere orbicularia 8–9 mm. longa, longiuscule glanduloso-apiculata membranacea reticulato-nervosa. Vexillum reniforme circ. 2.8 cm. latum 1.8–2 cm. longum costa distincte carinata apicem versus cornuta. Alae 3.5 cm. longae vel paulo ultro breviter stipitatae ; lobus basalis subrotundatus diametro circ. 1.4 cm. ; distalis fere duplo longior falcatim flabelliformis obtusus. Labellum late saccatum cum calcare circ. 3 cm. longum medio (in sicco) circ. 1.5 cm. latum, basi in calcar circ. 1 cm. longum incurvum abrupte attenuatum ore 1.8 cm. lato ascendente apiculato. Filamenta 3–4 mm. longa antheris acutatis. Ovarium lineare acutum. Fructus deest.

"Plant of 1–3 ft. Flowers rose purple with darker markings. Moist open and shady situations on humus-covered boulders in side valleys on the eastern flank of the Tali Range, West Yunnan. Lat. 25° 40′ N. Alt. 9000–10,000 ft. July 1906." G. Forrest. No. 4275.

"Branched plant of 1–2 ft. Flowers rose-red. Sides of streams and similar moist shady situations on the Irrawadi-Ming-Kwang divide, also in the Irrawadi basin, Upper Burma. Lat. 25° 50′ N. Alt. 8000–10,000 ft. Oct. 1905." G. Forrest. No. 1002.

4k **Impatiens pinetorum,** Hook. f. nomen tantum in Herb. Kew. et Herb. Edin. descr. W. W. Sm.

Species inter *I. loulanensem*, Hook. f. et *I. dichroam*, Hook. f. in Herbario Kewensi a claro Hookero f. sub numero 26 apud species chinenses posita.

Herba erecta ramosa glabra 30–60 cm. alta floribus majusculis caule sat robusto ramisque foliosis. Folia 4–10 cm. longa, 2–4.5 cm. lata, alterna apicem versus approximata petiolata membranacea ovato-elliptica vel subelliptica acuta vel acuminata, crenata setulis nigris inter crenaturas interjectis, subtus glauca basi in petiolum brevem (5–10 mm.) angustata, nervis utrinque 6–8. Pedunculi foliis breviores vel subaequantes graciles erecti saepe apices ramulorum versus aggregati multiflori; pedicelli filiformes usque ad 1 cm. longi; bracteae ovatae usque ad 5 mm. longae in aristam glanduligeram circ. 1 mm. longam productae. Flores ad 2 cm. vel paulo ultro expansi luteo-albi kermesino-maculata. Sepala 2, oblique ovata 8–10 mm. longa in aristam brevem acuminata membranacea nervis obscuris. Vexillum rotundatum 10–12 mm. diametro costa dorso carinata mucronata. Alae ad 2.5 cm. longae basi cuneatae; lobus basalis subrotundus; distalis multo longior a basi perpaululum dilatata sensim angustatus acutus. Labelli infundibularis limbus symmetricus ad 3 cm. longus in calcar gracile ascendens vel (saltem in sicco) fere rectum limbo multo longius sensim attenuatus ore ascendente cuspidato. Filamenta circ. 3 mm. longa. Ovarium haud maturum fusiforme rectum.

"Plant of 1–2 ft. Flowers yellowish white with a spot of crimson on the lower lobe. Very moist situations in pine woods on the Teng Yueh-Talifu road, near Shiu-Chai. Lat. 25° 15′ N. Alt. 7000–8000 ft. Sept. 1905. West Yunnan." G. Forrest. No. 1104.

Impatiens polyceras, Hook. f. nomen tantum in Herb. Edin. descr. W. W. Sm.

Species inter *I. cynantham*, Hook. f. et *I. margaritiferam*, Hook. f. in Herbario Kewensi a claro Hookero f. sub numero 47 apud species chinenses posita.

Herba erecta ramosa glabra 20–75 cm. alta floribus parvis caule robusto ramisque foliosis glandulis stipitatis hic illic sparse conspersis. Folia 5–7 cm. longa, 2–3 cm. lata, alterna petiolata in sicco tenuiter membranacea ovato-lanceolata vel lanceolata acuminata crenata setulis nigris inter crenaturas interjectis, subtus glauca basi in petiolum alatum circ. 1 cm. longum late cuneata nervis utrinque 5–7. Pedunculi folia suprema subaequantia graciles erecti multiflori; pedicelli filiformes 1–1.5 cm. longi; bracteae lanceolatae 2–3 mm. longae in aristam brevem glanduligeram productae. Flores inter minores aurantiaci. Sepala 2, oblique lanceolata 3–4.5 mm. longa, in aristam glanduligeram producta. Vexillum orbiculare vel oblatum circ. 6 mm. diametro dorso bene carinatum. Alae sessiles 1.5–2 cm. longae; lobus basalis subrotundatus;

distalis paullo longior dolabriformis obtusus. Labelli limbus cymbiformis usque ad 2.5 cm. longus in calcar gracillimum incurvum limbo longius attenuatus, ore 8–9 mm. diametro paullo ascendente apiculato. Filamenta circ. 2 mm. longa antheris obtusis. Ovarium lineare apiculatum. Capsulae 1–1.5 cm. longae lineares oligospermae. Semina obovoidea circ. 2.5 mm. longa subtuberculata fulva.

"Sides of streams on descent of pass between Sung Kwei and Lang Kung Valleys. Alt. 9000 ft. Yunnan, 1904." G. Forrest. No. 483. *Type.*

"Plant of 1–2½ ft. Flowers orange. Moist pasture along the base of cliffs on the eastern flank of the Tali Range, Yunnan. Lat. 25° 40′ N. Alt. 9000–10,000 ft. Aug. 1910." G. Forrest. No. 6904.

Also at Tsekou, Yunnan; coll. Père T. Monbeig, in Kerb. Kew.

302 **Magnolia taliensis,** W. W. Sm. Sp. nov.

Species ex affinitate *M. pumilae,* Andr.; foliis subobtusis subtus fulvo-pilosulis, ovariis glabris recedit.

Arbor vel frutex 3–7 m. alta, ramulis rubridis primo sparse rufo-pilosulis, mox glabris. Folia (superiora juniora tantum visa) 5–9 cm. longa, 2–4 cm. lata, oblonga, basi subrotundata, apice obtusa vel subobtusa, tenuiter membranacea, supra glabra costa rufo-pilosula excepta, infra pallidiora plus minusve sparse rufo-pilosula, nervis circ. 10 paribus, supra obscuris, infra eminentibus, ut costa densius rufo-pilosulis. Pedunculi breves, 5–15 mm. longi, arcuati, uniflori, rufo-pilosuli. Flores subcernui 8–9 cm. diametro, albi. Sepala 3, ovata, obtusa, ad 3 cm. longa. Petala 6, ovato-oblonga, ad 4 cm. longa. Stamina numerosa antheris 8 mm. longis filamentis 2 mm. longis, spica ovariorum minora. Carpella (immatura) glabra, rostrata, 2-seminifera.

"Shrub or tree of 8–20 ft. Flowers cream-coloured. Dry open situations amongst scrub on the eastern flank of the Tali Range. Alt. 7000–8000 ft. Lat. 25° 40′ N. July 1910." G. Forrest. No. 7182.

3946 **Pleurospermum aromaticum,** W. W. Sm.

Species affinis *P. Davidi,* Franch. sed foliis bracteisque inter alia manifeste divergit.

Rhizoma crassum. Caulis 60–90 cm. altus, basi reliquiis petiolorum pristinorum loriformibus cinctus, glaber. Folia firme papyracea glabra subtus glauca venis utrinque conspicue glandulis conspersis, petiolo 15–20 cm. longo robusto praedita; lamina ambitu ovata 20–25 cm. longa, 4-pinnata; pinnae primariae tres; segmenta ultima ovata circ. 2.5 cm. longa, 1.5 cm. lata, ad medium pinnatifida, lobulis ultimis ovatis circ. 5 mm. longis obtusiusculis margine minute scabridulis; folia superiora vaginis usque ad 6 cm. longis praedita. Umbellarum pedunculi usque ad 20 cm. longi robusti glabri; involucri phylla 5–7, foliacea, 10–20 cm. longa pinnata vel bipinnata segmentis similibus eis foliorum radicalium sed angustioribus, vagina ± magna praedita; umbellae radii 30–50, robusti glabri 7–10 cm. longi; involucelli phylla ± 10, linearia, nonnunquam apicem versus tripartita, complanata, dorso margineque albo-glanduloso-serratula, 3–5 cm. longa, flores superantia viridia nec scariosa; umbellulae 30–50-florae; pedicelli 6–8 mm. longi. Petala obovata circ. 2.5 mm. longa, circ. 2 mm. lata apice inflexa albida. Ovarium (immaturum) atro-viride circ. 2 mm. longum.

"Plant of 2–3 ft, strongly aromatic. Petals dull white, gynaecium dark green. Root used medicinally by the Chinese. Ledges of cliffs and rocky alpine pasture on the western flank of the Lichiang Range. Lat. 27° 30′ N. Alt. 12,000–13,000 ft. July 1910." G. Forrest. No. 6188.

Pleurospermum linearilobum, W. W. Sm. Sp. nov.

Species valde affinis *P. foetenti*, Franch. sed habitu elatiore foliis aliter divisis inter alia differt.

Rhizoma sat crassum. Caulis 60–120 cm. altus, robustus, vaginis foliorum inferiorum hornotinorum et pristinorum membranaceis usque ad 10 cm. cinctus, glaber. Folia papyracea glabra subtus glaucescentia, vaginis angustis 4–5 cm. longis petiolis 6–10 cm. longis praedita; lamina ambitu ovato-oblonga, 8–10 cm. longa, 3-pinnata; pinnae primariae 3–4-jugae; segmenta ultima circ. 1 cm. longa in lobulos lineares 3–5 mm. longos partita. Umbellarum pedunculi 15–20 cm. longi robusti striati glabri; involucri phylla 8–12, foliacea, 2–4 cm. longa, pinnata vel bipinnata lobulis ultimis similibus eis foliorum radicalium, vaginā latiusculā praedita; umbellae radii ± 25, robusti glabri usque ad 8 cm. longi; involucelli phylla 6–8, elliptica vel obovata, 5–10 mm. longa, nunc omnino scariosa, nunc laminā parvā viridi 3–5-fida apice praedita, flores subaequantia; umbellulae ± 20-florae; pedicelli 8–10 mm. longi glabri. Petala suborbicularia 1 mm. longa, alba. Ovarium (immaturum) circ. 2 mm. longum circ. 2 mm. latum ei *P. foetentis*, Franch. simillimum.

"Plant of 2 ft. Flowers white. Shady situations amongst scrub on the eastern flank of the Lichiang Range. Lat. 27° 20′ N. Alt. 10,000–11,000 ft. July 1910." G. Forrest. No. 6181. *Type.*

"Plant of 1–2 ft. Petals white. Shady openings in pine and mixed forests on the eastern flank of the Lichiang Range. Lat. 27° 20′ N. Alt. 10,000–11,000 ft. July 1910." G. Forrest. No. 6051.

This species does not appear to have the rank odour characteristic of *P. foetens*, Franch., which is its nearest ally.

155 **Rhododendron Clementinae**, G. Forrest.

Species cum nulla specie foliis subtus tomentosis praedita adhuc descripta congruens; ex descriptione ad *R. Principis*, Franch. spectat a quo sepalis haud ciliolatis staminibus furfuraceo-pilosis inter alia discrepat.

Frutex 2–3 m. altus erectus; rami hornotini breves crassissimi glabri vetustiores cinerei decorticantes; gemmae foliares ovoideae perulis ovatis apiculatis glabris. Folia 9–11 cm. longa, 4–6 cm. lata ovalia apice rotundata vel obtusissima vix vel breviter indurato-apiculata basi aeque rotundata vix vel breviter cordatula margine paullulo revoluta valde coriacea supra atroviridia rugosula nervulis reticulatis haud lucida glabra subtus tomento denso mollissimo cinnamomeo induta; costa supra leviter impressa subtus prominula; petioli ± 2 cm. longi crassi glabri. Inflorescentia densa floribus 7–10 fere umbellatis composita; pedicelli sub anthesin 2–3 cm. longi erecti glabri, in fructu crassati rigidissimi. Calyx minimus ± 1 mm. longus in lobos triangulares partitus, fructu in discum lignosum 4–5 mm. diametro auctus. Corolla lactea kesmesino-maculata late campanulata 4–4.5 cm. longa siccitate complanata ore ± 6 cm. lata; tubus 2.5–3 cm. longus basi fere 1 cm. lata extus glaber intus basi ipsa pilosulus; lobi rotundati 1.5–2 cm. diametro breviter emarginati glabri. Stamina usque ad 15 inclusa inaequalia longiora 2 cm. longa filamentis basi fere ad medium albido-furfuraceo-pilosis, antheris 2 mm. longis ochraceis. Ovarium oblongum sulcatum 7–8 mm. longum glabrum; stylus vix 2 cm. longus deflexus glaber stigmate lobulato praeditus. Capsula fere 2 cm. longa, circ. 1 cm. lata, cylindrica recta 7–8-sulcata, ante maturitatem saturate atropurpurea, stylo vulgo delapso nonnunquam persistente. Semina numerosa ± 1 mm. longa angulata brunnea.

"Shrub of 6–9 ft. Flowers creamy-white with crimson markings. Fruits deep black-purple. In open thickets on the mountains of the Chungtien plateau. Lat. 27° 55′ N. Alt. 11,000 ft. Aug. 1913." G. Forrest. No. 10,857.

"Duplicate of No. 10,857 in mature fruit. Oct. 1913." G. Forrest. No. 11,486.

"Duplicate of above collected in 1914 in flower." G. Forrest. No. 12,789.

The species is dedicated to my wife.

Rhododendron Roxieana, G. Forrest. Sp. nov.

Species distinctissima affinis *R. taliensi,* Franch. a quo foliis confertis anguste oblanceolatis subtus densissime ferrugineo-tomentosis pedicellis multo minoribus ovariis tomentosis inter alia recedit.

Frutex 1.5–3 m. altus erectus; ramuli hornotini breves crassi foliis congestis fere omnino velati densissime ferrugineo-tomentosi, vetustiores squamis petiolisque emarcidis atratis induti demum cinerei decorticantes; gemmae florales ovoideae perulis ± late ovatis usque ad 2.5 cm. longis apice rotundatis vel breviter acuminatis extus dense tomentosis intus sparsius. Folia 7–10 cm. longa, 1–1.5 cm. lata, lineari-oblanceolata vel rarius anguste lanceolata apice vulgo acuta indurato-apiculata basi sensim in petiolum angustata margine paulo revoluta (juventute multo magis revoluta) coriacea supra atroviridia rugosula nitida glabra subtus densissime ferrugineo-tomentosa (juventute prima tomentum sordide album); costa supra impressa subtus elevata; petioli ± 1 cm. longi crassi dense ferrugineo-tomentosi. Inflorescentia densa floribus ± 10 fere umbellatis composita; pedicelli sub anthesin 1–1.5 cm. longi tomento denso sordide albido induti. Calyx minimus 0.5 mm. longus vel paulo ultro albido-tomentosus lobis triangularibus haud distinctis. Corolla alba extus roseo-tincta campanulata 2.5–3 cm. longa, siccitate complanata ore 3–3.5 cm. lata; tubus ± 2 cm. longus, basi circ. 5 mm. latus, extus intusque glaber; lobi rotundati 1–1.5 cm. diametro breviter emarginati glabri. Stamina 10, inclusa inaequalia longiora 1.6–1.7 cm. longa filamentis complanatis supra glabris in triente inferiore albo-pilosulis antheris 1 mm. longis ochraceis. Ovarium oblongum sulcatum circ. 3 mm. longum, longiuscule albido-tomentosum; stylus vix 2 cm. longus glaber stigmate lobulato praeditus. Fructus maturus deest.

"Shrub of 4–6 ft. Flowers white, flushed rose on exterior. Boulder-strewn slopes on the mountains in the N.E. of the Yangtze bend, Yunnan, West China. Lat. 27° 45′ N. Alt. 11,000–12,000 ft. July 1913." G. Forrest. No. 10,540.

"Shrub of 8–10 ft. Flowers rose? In open thickets on the mountains in the N.E. of the Yangtze bend. Lat. 27° 45′ N. Alt. 10,000 ft. Aug. 1913." G. Forrest. No. 10,991.

"Flowers white. 1914." G. Forrest. Nos. 12,609, 13,005.

N.W. Yunnan. 1907. Monbeig. No. 169 in Herb. Edin.

This very distinct-looking plant is akin to *Rhododendron taliensis*, Franch., but differs markedly in the narrow, closely set leaves. I take this opportunity of acknowledging my indebtedness for kind hospitality to Mr. and Mrs. Hanna, of Tali-fu, by dedicating this plant to the latter.

Saxifraga macrostigma (Franch.) Engl. et Irmscher, var. **cordifolia,** W. W. Sm. Var. nov.

Habitus et magnitudo varietatis *Georgeanae,* Engl. et Irmscher. Dense caespitosa. Caules bene foliati, dense et longe glanduloso-albo-pilosi. Folia caulina late cordato-ovata, 5–7 mm. longa, 4–5 mm. lata, pilis brevibus glanduliferis supra et margine plus minusve dense obsita, infra glabra vel sparse glandulosa. Pedicelli uniflori dense et longe glanduloso-pilosi. Petala quam sepala 2-plo longiora, oblongo-ovata, circ. 7 mm. longa, circ. 4 mm. lata.

China :—Lichiang Range, Yunnan. G. Forrest. Sine num. in Herb. Edin. Cult. in Hort. Reg. Bot. Edin.

Tanacetum Delavayi, Franch. mss. in Herb. Paris. ex Diels in Roy. Bot. Gard., Edin., Notes, vii (1913), 405—nomen. Ex speciminibus Forrestianis tantum descr. W. W. Sm.

Species nana foliis fere omnibus radicalibus, capitulis in globulum congestis conspicua. Planta 10–20 cm. alta, erecta, aromatica, rhizomate crasso tuberoso praedita. Caules 1–2 basi bene foliati, supra fere nudi, infra ± dense incano-villosi, sub inflorescentia dense incano-tomentosi. Folia radicalia 6–10, petiolata petiolo 3–5 cm. longo incano-villosulo ; lamina 3–6 cm. longa, circ. 2 cm. lata, ambitu oblonga, 2-plo pinnatipartita ; segmenta ultima 5–7 mm. longa linearia acuta supra viridia glabra vel subglabra subtus albo-villosa ; folia caulina remota, multo reducta, 1.5–2.5 cm. longa, segmentis linearibus pinnatifida. Capitula 15–20, in globulum circ. 2 cm. diametro plerumque congesta, raro paulo diffusa, 6–7 mm. diametro, sessilia vel pedunculo 2–4 mm. longo praedita. Involucri phylla circ. 4 mm. longa, circ. 1 mm. lata, oblonga acuta vel obtusiuscula, pallida scariosa glabra, apice marginibusque purpurascentia. Corolla aurantiaca glabra circ. 4 mm. longa ; pappus deest.

" Plant of 3–9 inches, strongly aromatic. Flowers bright orange-yellow. Open rocky situations on mountain meadows on the eastern flank of the Lichiang Range, Yunnan. Lat. 27° 25′ N. Alt. 12,000–13,000 ft. Sept. 1906." G. Forrest. No. 3047.

" Aromatic plant of 4–9 inches. Flowers yellow. Open mountain meadows on the eastern flank of the Lichiang Range. Lat. 27° 35′ N. Alt. 12,000 ft. Sept. 1910." G. Forrest. No. 6557.

Trachydium ? simplicifolium, W. W. Sm. Sp. nov.

Planta distinctissima, dubie ad *Trachydium* relata; cum illo genere ob folia simplicia ob involucri phyllorum absentiam bene non quadrat; fructus (immaturus) ad *Trachydium* certe spectat; fortasse typus generis novi sed sine fructu maturo vix recte describi potest.

Planta perennis 7–10 cm. alta rhizomate modice crasso praedita. Caulis solitarius erectus ± sparse albo-patenti-pilosulus. Folia 3–5, simplicia; radicalia vel subradicalia 1–2, petiolo 3–7 cm. longo dense albo-pilosulo vagina ampla 1–2 cm. longa praedita, 1.5–3 cm. longa, 2–4 cm. lata, saepius latiora quam longiora, ambitu latissime ovata breviter vel usque ad medium in lobos tres ovatos grosse crenatos divisa, basi ± alte cordata, subcoriacea utrinque glabra vel subglabra rarius margine minute pilosula supra viridia subtus pulchre purpurascentia nervis 5 basi digitatim abeuntibus; folia caulina radicalibus subsimilia sed minora petiolis multo reductis laminis nonnunquam vaginae insidentibus, suprema ad vaginam magnam et laminam perpusillam reducta. Inflorescentia folia vix superans; umbellae 2-3; involucri phylla nulla; umbellae radii 6–10, 1–1.5 cm. longi, glabri; involucelli phylla ± 10, circ. 5 mm. longa, linearia; umbellulae radii ± 20, circ. 5 mm. longi. Sepala inconspicua. Petala alba saepe purpurascentia obovata vel suborbicularia apice paulo inflexa basi in unguem brevissimum angustata, 1 mm. longa vel paulo ultro. Ovarium atro-viride 1–1.5 mm. longum. Fructus (immaturus) a latere paulo compressus ad commissuram constrictus jugis carpelli 5 obtusis vittis ad valleculas solitariis vel rarius binis.

" Plant of 3–4 inches. Petals white, gynaeceum dark green. Barren limy pasture on the eastern flank of the Lichiang Range. Lat. 27° 30′ N. Alt. 9000–10,000 ft. Oct. 1910." G. Forrest. No. 7394.

A very distinct plant which has been put provisionally in the genus *Trachydium*. The simple leaves and the want of involucre make it a very anomalous member of that genus, and it may yet have to be transferred. The fruit bearing a very close relationship to that of *Trachydium* is unfortunately not mature.

SPECIES AFRICANAE.

Bulbophyllum inopinatum, W. W. Sm. Sp. nov.

Species ex affinitate *B. nudiscapi*, Rolfe a quo petalis nigropurpureis suborbicularibus longe ciliatis facile distinguitur.

Pseudobulbi ovoidei teretes nec angulati 3–4 cm. longi vaginis tenuiter membranaceis emarcidis hinc inde obtecti, monophylli. Folia oblonga, ad 15 cm. longa, ad 3 cm. lata, subobtusa, basi in petiolum 4 cm. longum alte canaliculatum attenuata. Scapi elongati, ad 50 cm. longi, glabri, parte superiore florigera deflexa nigrescente minute punctulata, parte inferiore erecta viridi vaginis spathaceis distantibus circ. 1 cm. longis praedita; spicae multiflorae bracteis ovato-lanceolatis acutis circ. 4 mm. longis nigridis. Sepala 8–9 mm. longa, basi 3 mm. lata, ovato-lanceolata, acuminata, glabra viridia lineis purpureo-brunneis ± 5 percursa. Petala orbicularia circ. 1 mm. diametro, atro-purpurea margine pilis fuscis longiusculis ciliata basi viridia glabra. Labellum mobile circ. 5–6 mm. longum lineari-lanceolatum, basi circ. 2 mm. latum, atro-purpureum, medio labello excepto densissime crinitum apice pilis 2–3 mm. longis patentibus purpureo-fuscis basi praesertim in marginibus pilis circ. 1 mm. longis fuscis. Columna circ. 2 mm. longa dentibus falcatis longe acuminatis.

Cultivated in Royal Botanic Garden, Edinburgh. Its origin is obscure, but from its very marked similarity to *B. nudiscapum* and its allies it is in all probability from West Tropical Africa. The structure of the petals is the most marked distinction between it and its nearest allies. The labellum is very mobile, densely clothed, except in the middle, with long hairs; the hairs near the tip are susceptible to the slightest current of air.

Polystachya Hamiltonii, W. W. Sm. Sp. nov.

Species in vicinitatem *P. Kirkii*, Rolfe et *P. affinis*, Lindl. ponenda; foliis longis, inflorescentiis racemosis, floribus circ. 8 mm. longis, labello trilobo appropinquat, structurā floris valde recedit.

Pseudobulbi caespitosi anguste ovoidei, circ. 2.5 cm. longi, vaginis membranaceis striatis praediti, 3–4-phylli. Folia usque ad 12 cm. longa, ± 2 cm. lata, oblonga, apice obtusa breviter et oblique emarginata, subcoriacea. Scapi erecti compressi pauciflori (4–6-flori) 4–5 cm. longi, minute pubescentes. Bracteae squamiformes ovatae acuminatae 2–3 mm. longae sparse pubescentes. Pedicelli circ. 5 mm. longi dense pubescentes. Sepalum dorsale ovatum acutum 5–6 mm. longum, 2 mm. latum, planum, extus sparse pubescens intus glabrum; sepala lateralia oblique triangulari-ovata acuta 8–9 mm. longa 3 mm. lata paululo concava extus puberula. Petala anguste spathulata 4 mm. longa, 1 mm. lata, glabra. Labellum trilobum paululo recurvum 7 mm. longum, medio 4 mm. latum; lobi laterales erecti subauriculaeformes 2 mm. lati glabri; lobus intermedius late ovatus obtusus 2 mm. longus vix 2 mm. latus; per totum labellum apice excepta currit linea intermedia 1 mm. lata dense albido-furfuraceo-tomentella. Columna circ. 2 mm. longa, vix 2 mm. lata basi in pedem 3 mm. longum producta.

Nigeria:—Exact locality as yet unknown. Sent to the Royal Botanic Garden by Mr. Kenneth Hamilton in 1913, and flowered in July 1914. The flowers are of a greenish yellow; the trilobed labellum is traversed longitudinally by a narrow strip of whitish scaly tomentum.

SPECIES HIMALENSIS.

Sedum Praegerianum, W. W. Sm. Sp. nov.

Species ex affinitate *S. linearifolii*, Royle; foliis floribusque minoribus, petalis erectis apice approximatis haudquaquam patentibus inter alia recedit; haud remota a *Sedo Hobsonii*, Hamet quod foliis ovatis differt.

Planta perennis radicibus crassiusculis. Caudex erectus crassus. Caules floriferi 7–12 cm. longi graciliusculi simplices glabri rubri, in cultura certe ± prostrati, in speciminibus siccis ut videtur nonnunquam suberecti. Folia alterna, infra insertionem in calcar non producta, 8–9 mm. longa, circ. 3 mm. lata, lineari-oblonga apice obtusiuscula, vix petiolata, integerrima, glabra, apice marginibusque rubro-tincta. Inflorescentia subcorymbiformis 3–7-flora; bracteae foliis subsimiles vel multo minores lineares; pedicelli calyce multo breviores vel nonnunquam subaequantes. Calyx circ. 4 mm. longus, glaber, fere ad imum fissus in lobos lineari-lanceolatos acuminatos, pallido-viridis roseo-suffusus. Corolla circ. 6 mm. longa glabra rosea; petala basi paululo concreta, lineari-lanceolata, acuminata, brevissime apiculata, erectissima. Stamina 10 glabra, filamentis 4–5 mm. longis roseis. Carpella 5, circ. 5 mm. longa; squamae subquadratae, 1 mm. longae, brunneo-rubridae.

East Himalaya:—In the Chumbi Valley, Tibet, at Tarkarpo, at an elevation of 12,000 ft. Rohmoo Lepcha, No. 137 in Herb. Calc. et Herb. Edin. Also in cultivation in the Royal Botanic Garden, Edinburgh, where it flowered July 1914. A *Sedum* of very distinct appearance; the rose-coloured petals remain so erect, even approximate, that the flower has quite the semblance of an *Erica*.

The specific name is in honour of R. Lloyd Praeger, Esq., B.A., who has devoted much attention to the elucidation of the nomenclature of the species of this genus which are in cultivation.

Moultonia.

A New Genus of Gesneraceae from Borneo.

BY

PROFESSOR BAYLEY BALFOUR, F.R.S.,

AND

W. W. SMITH, M.A.

With Plates CXLVI-CXLVII.

Moultonia, Balf. fil. et W. W. Sm. Genus novum.

Genus *Gesneracearum* ex affinitate *Monophyllaeae,* R. Br. et *Epithematis,* Bl.; floribus petiolo et costae folii unici insidentibus, calyce quadrifido, fructu quasi-calyptrato e calyce tandem paulo protruso inter alia recedit.

Herba robusta folio unico magno cordato-ovato vel cordato-oblongo longe petiolato praedita. Pedunculi brevissimi lati; pedicelli breves; bracteae bracteolaeque minimae. Flores parvi numerosi haud regulariter distributi plerumque approximati, umbellis paucifloris fere sessilibus e sulco petioli et costa media uniseriatim orientes. Calyx alte 4-fidus lobis oblongis subcoriaceis paulo imbricatis intus pulvinulo calcario praeditis. Corolla parva; tubus brevis; limbus 2-labiatus. Stamina 4 perfecta; filamenta brevia linearia medio tubo affixa; antherae omnes cohaerentes reniformes vel subauriculiformes. Ovarium superum 1-loculare; stylus brevis linearis; stigma minutum. Capsula membranacea, maturitate e calyce paulo protrusa, apice longe quasi-calyptrata infra irregulariter rupta; placentae duae parietales bifidae undique ovuligerae. Semina numerosa minuta ovoidea vel subquadrata testa foveolato-rugosula praedita.

Species unica borneensis.

Moultonia singularis, Balf. fil. et W. W. Sm. Sp. nov. Pl. CXLVI.

Herba robusta unifolia; rhizoma vel radices non visae; caulis epigaeus nullus; petiolus 30–40 cm. longus, 1 cm. vel ultro diametro, striatus, supra canaliculatus ibique flores gignens, undique calcario-furfuraceus; folii lamina 30–35 cm. longa

20–30 cm. lata ovata vel oblongo-ovata basi cordata (apice in speciminibus siccis deficiente) integra in vivo aliquatenus carnosula supra atroviridis glabra infra undique scabridule calcario-furfuracea; costa supra canaliculata flores numerosos fere per longitudinem totam gerens, infra robusta eminens 5 mm. lata vel ultro, calcario-furfuracea; nervi primarii 20–30, valde conspicui subparalleli, inter se 1–3 cm. distantes, a costa recto angulo abeuntes marginem versus multo inflexi. Pedunculi brevissimi lati 1–3-flori; pedicelli 3–4 mm. longi fructu usque ad 1 cm. aucti, calcario-furfuracei; bracteae bracteolaeque minimae circ. 1 mm. longae lineares carnosulae. Flores parvi in sulco petioli atque costae folii crebre et fere continuo enati. Calyx campanulatus circ. 4 mm. longus deinde in fructu usque ad 5 mm. elongatus alte 4-fidus; lobi paulo imbricati erecti fructu conniventes oblongi plus minusve obtusi marginibus membranacei medio subcoriacei extus calcario-furfuracei intus marginibus exceptis pulvinulo calcario obtecti. Corolla parva, (evoluta non nobis visa, in alabastro inaperto examinata); tubus brevis; limbus 2-labiatus labio postico 2-fido, antico nondum (in alabastro) partito. Stamina perfecta 4, in alabastro subaequalia circ. 1 mm. longa medio tubo affixa; filamenta circ. 0.5 mm. longa, nigrida, glabra; antherae omnes latere cohaerentes vix 1 mm. diametro subauriculiformes vel reniformes. Discus cupularis fere ad medium ovarium pertinens. Ovarium superum globosum stylo lineari ovarium paulo superante stigmate inconspicuo truncatulo. Capsulae maturae pars inferior seminifera globosa circ. 1.5 mm. diametro membranacea fragilis irregulariter transverse rupta; pars superior calyptriformis anguste conicum circ. 4 mm. longa basi 1 mm. lata, solida, e calyce paulo protrusa. Semina numerosa vix 0.25 mm. longa ovoidea vel globoso-ovoidea vel aliquatenus subquadrata nonnunquam paulo angulata atrobrunnea testa foveolato-rugosula praedita.

Borneo:—Sudan, Sarawak. Feb. 1914. Native Collector. No. D53.

The generic name is given in honour of J. C. Moulton, Esq., Curator of the Sarawak Museum, to whose endeavours the discovery of this and other interesting Bornean plants is due.

We have described this plant as possessing a single leaf with a leaf-petiole and epiphyllous inflorescence, and the dried material at our disposal sanctions no other course. If we follow convention in this we by no means intend thereby to express our view of the morphological value of the vegetative parts described. The plant seems to us to have special interest from the morphological side, but the true explanation of its parts can only

be arrived at by an investigation of the living plant. To enable this to be made we must hope that Mr. Moulton may be able to obtain ripe seeds for the cultivation of the plant. Meanwhile we may give here the morphological interpretation which appears to us as probably the right one of the parts as we know them.

We suggest that the stalk and broad lamina are the parts of an outgrowth from the primitive protocorm of the plant—the stalk being hypocotyl, the lamina cotyledon—which it will not surprise us to learn has no other vegetative organs. From this protocormic outgrowth which possesses great meristematic activity the flowers arise. The whole construction of *Moultonia* is to us that of a plant showing a permanently embryonic vegetative state.

Let us clearly understand what this means.

Of the egg out of which every angiospermous plant develops one-half is devoted to the formation of a body of meristem-cells which is the primitive corm—protocorm—of a future plant; to the other half which forms the suspensor is assigned the primary duty of regulating the position of the protocorm within the seed and of aiding in the feeding of it. The whole product of the egg—suspensor and protocorm—is commonly known as the proembryo, and is adapted to the intraseminal phase of life of the organism preceding the period of rest incidental to the seed habit. The degree to which development proceeds up to rest varies. As a minimum the suspensor may be no more than a single cell and the protocorm an undifferentiated body of a few meristem-cells. More advanced the suspensor may be pluricellular, even massive, with haustorial outgrowths penetrating far in search of food, and likewise the protocorm becomes a body with haustorial extension in the form of lobes (one in Monocotyledons, two in Dicotyledons)—the cotyledon; so that there is differentiation into a central mass—hypocotyl—and cotyledon one or more. This may be all. But in more advanced states—and these are perhaps the more usual—a primordium of the hypogeous axis of the mature plant is laid down at the basal end of the protocorm as the primary root, and a primordium of the epigeous axis is laid down—at the apical end of the protocorm when there are two or more lateral cotyledons, at the side when there is one terminal one—as the plumular bud. There may be several such primordia. What has to be emphasised here is that the ordinary angiospermous plant, as we see it, is the product of two primordia arising out of the protocorm. The protocorm is the embryonic stage. The root and shoot of the plant are the mature stage. In the former potential meristematic activity is spread through the whole protocorm, and this is very different from the restricted meristematic activity that is found in the epicotylar shoot. In most Angiosperms the embryonic protocorm, shedding its haustorial cotyledons after they have performed their function during transition of the organism from intraseminal to extraseminal life, loses individuality in its fate as connecting link betwixt the root and shoot of the mature plant.

In the light of what we have just said, we suggest that *Moultonia* is one of those plants which never goes beyond the stage of the protocorm. It never forms primordia of primary root or plumular bud. The vegetative apparatus—long-stalked lamina—is a primitive outgrowth, become assimilating, of the protocorm. That it will have at its base many adventitious absorbing roots we expect, though our material gives no indication of them. The laminar portion we take to be cotyledon. Probably the stalk part of it may be less cotyledon than hypocotyl, but of that we can say nothing definite. We are more certain of the correctness of the suggestion we make that this outgrowth is persistently meristematic throughout, and in the mid-line of its upper surface at least, for it is there that the flower-buds arise in linear series but not in age sequence from below upwards or from above downwards. Young and old are intermingled throughout the length.*

It may be asked what are the grounds upon which we base the views expressed above. We will explain.

To do this we recall the well-known features of germination exhibited by other genera of Gesneraceae. Let us begin with *Streptocarpus*.† Taking in the first instance *S. polyanthus*,

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* A cotyledon is often like a leaf in its later stages of life, and is perhaps most commonly spoken of as a leaf. But a leaf is an organ of the epicotylar axis proceeding from the plumular bud. The leaf arises as a lateral structure from one of its nodes. A cotyledon as an extension of the embryonic protocorm may proceed from the end of the protocorm or from its sides, and does not present in its evolution the fundamental criteria required by the foundations of morphology for being reckoned the homologue of an epicotylar leaf. Entering this caveat, we are content in our systematic description to speak of the vegetative body of *Moultonia* as a leaf with a petiole and having epiphyllous inflorescence.

† Crocker, Notes on Germination of Certain Species of Cyrtandreae in Journ. Linn. Soc. v (1861), 65, t. iv; Dickie, Note of Observations and Experiments in Germination in Journ. Linn. Soc. ix (1867), 126; Dickson, On the Germination of *Streptocarpus caulescens* in Trans. Bot. Soc. Edin., xiv (1883), 362, Pl. xiv; Hielscher, Anatomie und Biologie der Gattung Streptocarpus in Cohn's Beiträge iii (1883), 1, tt. i–iii; Fritsch, Ueber die Entwicklung des Gesneraceen in Ber. d. deutsch. Bot. Gesellsch. (Gen. Versamml.) xii (1894), 26.

Crocker was foreman of the Propagation Department, Royal Gardens, Kew, and was the first to record the features of germination of *Streptocarpus*. His observations were exact, and he distinctly states that there is an absence of all trace of plumule. His figures found their way into the botanical text-books of the period. We mention this because his work, as well as that of Dickie and Dickson is ignored by Hielscher, who is quoted in most modern German books as if he were the observer who first made known the facts.

Hook., we find within its seed at the period when it is ripe the protocorm of the embryo as an elongated ovoid body showing towards the apical end two lateral outgrowths of equal size —the cotyledons. There is no trace of a primordium of a primary root, nor of a plumular bud, and there never is. When germination takes place, the whole surface of the protocorm becomes covered with absorptive hairs. One of the cotyledons is arrested in growth, the other elongates and growing rapidly by basal intercalary growth forms in time a broad green lamina without stalk. Soon a series of adventitious roots develop from the hypocotyl and also from the cotyledon base. The top of the hypocotyl where the cotyledons are does not in this species show much growth in length, and the cotyledons remain about the same level. Soon the smaller arrested one withers and dies off, so that the whole vegetative organisation of the plant is an enlarged green cotyledon with a basal portion of hypocotyl and adventitious rootlets. Year by year the intercalary growth of the cotyledon proceeds and further rootlets are formed. That is the whole mature vegetative plant. If at an early period the enlarging cotyledon be removed, the arrested one opposite to it on the protocorm may develop into the same form. Here there is never a vegetative epicotyl, never a primary root. The vegetative body is a persistently growing extension of the embryonic state. A like explanation covers the case of *Lemna* amongst Monocotyls—only there the embryonic form repeats itself in successive branchings.

This is the type of what in systematic works is named the "Unifoliate" Streptocarpi.

At flowering period the inflorescence takes origin in the hypocotyl within the sinus at the base of the enlarged cotyledon and develops a scapose axis or scapose axes with many flowers in biparous cymose branching. It never spreads over the laminar area. Meristematic activity seems to be located in the hypocotyl at the base of the cotyledonary lamina. How exactly the flower-axis arises has not been really observed in this species. We do not yet know whether the apex of the hypocotyl forms a primordium which can be interpreted as a postponed plumular bud with destiny of flower production only, or whether the origin of the inflorescence is spread over a wider linear or broader area of the hypocotyl. The figure of *Acanthonema strigosum*, Hook. f., in the Botanical Magazine (1862), t. 5339, indicates a like history of development in that species.

Take now the case of *S. Rexii*, Lindl., as described by Dickie (with which that of *S. primuloides*, Dickie, conforms). Here the development starts as in the preceding case, but the top of the hypocotyl on the side next and below one of the cotyledons grows out for a short distance so that the two cotyledons are separated by a length of hypocotyl. The cotyledon left behind is the arrested one. The other enlarges, and a cursory examination of a seedling at this stage might suggest the presence of two cotyledons: one sessile small, and one petiolate large. The apparent petiole—and it is so called by Hielscher—is really the hypocotyl. When *S. Rexii*, Lindl., flowers it forms one-flowered scapes and these take origin close to the sinus of the cotyledonary lamina from the hypocotyl meristem tissue in a "simple tangential row." Here we have the case of *S. polyanthus* over again, only that the elongation of the hypocotyl has created the appearance of a petiole, and so the flower-axis seems to come from where an apparent petiole joins a lamina. This is not all, however. In *S. Rexii*, Lindl., there appears at the cotyledonary sinus a cluster of stalked leaf-like structures. These form a sort of rosette and are characteristic of the "Rosulate" Streptocarpi. The published accounts of their origin are vague in terms, and their relation to the inflorescence is not clear. They are said to come off alternately from a whole series of centres whilst the inflorescences are developed in a simple basifugal row. We are in no better case here than with *S. polyanthus*, Hook., for the determination of the morphological relationship of these later vegetative structures and of the inflorescence to the protocorm. All we can recognise is that there is a vegetative organisation superposed upon the condition that is permanent in *S. polyanthus*, Hook. For its reconciliation with normal plumular development further investigation is required.

Then we have a state of further differentiation in *S. caulescens*, Vatke, as Dickson showed, typical of the whole series of "Streptocarpi Caulescentes." Here the same general lines of early development of the protocorm are followed, and there is an elongation of the hypocotyl between the cotyledons the upper of which is the larger. This upper cotyledon does not reach extravagant size; it has quite the appearance of a petiolate cotyledon coming off from the hypocotyl. From the hypocotyl and in apparent upward continuation of it ascends an axis like an ordinary epicotylar noded axis bearing foliage-leaves which are like the larger cotyledon in form. How this axis arises, if from a plumular bud or no, is not described. Its appearance suggests such normal evolution as occurs in many other Gesneraceae.

The suggestions conveyed in the construction of these Streptocarpi have led us to the interpretation we have predicated for *Moultonia*. One may suppose that the hypocotyl below an upper enlarged cotyledon has grown out to form the stalk with the lamina of the cotyledon at its end and that the inflorescence meristem instead of being strictly limited to an area at the base of the cotyledon, is spread along the hypocotyl and also along the lamina.

As an intermediate condition we may bring into the case the evidence offered by *Monophyllaea.*

We have pointed out that *Moultonia* is allied to *Monophyllaea.* This genus we only know from the description and figure given by Clarke.* Clarke suggests, we think rightly, that the *folium unicum* of his plant is a cotyledon. There appears to be in *Monophyllaea* a single stalked leaf—to speak conventionally—as in *Moultonia,* but the stalk is shorter and at the junction of lamina and stalk scapose inflorescences arise. At the summit of the scapes the flowers are disposed in a unilateral spicate raceme which curls over circinately. We should interpret all this construction as that of a hypocotyl elongated in the form of a petiole and bearing at its extremity a cotyledonary lamina. We should expect in the young protocorm to find a second smaller arrested cotyledon. At the point where cotyledonary lamina and hypocotyl join the inflorescence arises from the hypocotyl. The meristem for the inflorescence is localised at this region.

Of the allied *Epithema* we have insufficient knowledge to allow of our making a suggestion of interpretation.

The following morphological series within the plants named issues from what we have said :—

Streptocarpus polyanthus, Hook.—hypocotyl not elongated, cotyledon sessile, scapose inflorescence with open biparous branching developing from hypocotyl base of cotyledonar lamina.

Streptocarpus Rexii, Lindl.—hypocotyl shortly elongated, giving apparent stalk to cotyledon, scapose inflorescence (1 flower) developing from hypocotyl at base of cotyledonar lamina.

Monophyllaea—hypocotyl much elongated, giving apparent, long stalk to cotyledon, scapose inflorescence with unilateral racemes developing from hypotyl at base of cotyledonar lamina.

Moultonia—hypocotyl very much elongated, giving apparent very long stalk to cotyledon, inflorescence disposed in umbels originating along middle line on upper surface of whole length of elongated hypocotyl and on midrib of lamina (but not showing special relation to the primary veins).

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* C. B. Clarke, Cyrtandreae in De Candolle Monogr. Phanerog. v (1883–87). 181, t. xx.

We do not overlook other explanations that might be given of the construction in *Moultonia*. Thus, in absence of all evidence of the seedling condition it might be held that in both *Moultonia* and *Monophyllaea* the *folium unicum* is really an epicotylar leaf with which the inflorescence is more or less "congenitally concrescent." In such a view, the unilateral disposition of the flowers on the scapes in *Monophyllaea* might be regarded as a stage towards the complete fusion of scape with leaf in *Moultonia*. To us such concrescences do not appeal.

A more illuminative comparison may be made with what is seen in *Chirita hamosa*, R. Br., of which, however, we have not yet the clear explanation. In Plate CXLVII. is a figure of this plant when in flower. The opposite leaves are petiolate, and the flowers arise in a line upon the upper surface of each petiole. They are epipetiolar. The buds on the petiole are not, however, all flower-buds; some are foliage. The sequence is irregular. The position of the inflorescence recalls partially that of *Moultonia*. There is no concrescence here; simply foliar evolution of flower and buds. The seedling of *Chirita hamosa* has cotyledons differing in size and separated by a hypocotylar elongation. The upper is the larger, becomes stalked, and has quite the form of the adult leaf, but it never bears flowers or buds. Possibly then what we have been describing in *Moultonia* as a protocorm outgrowth may be after all an epicotylar leaf with epiphyllous inflorescences more extended than in *Chirita hamosa*.

The flower-structure of *Moultonia* is not without special interest. The gynaeceum is closed at the top by a solid cone like a style supported upon a stylopod, and this seems to separate as an operculum from the lower portion of the capsule which remains enclosed in the calyx. For a clear understanding of the mechanism of dehiscence better material than that at our disposal is necessary.

EXPLANATION OF PLATES CXLVI–CXLVII.

Illustrating Professor Bayley Balfour and Mr. W. W. Smith's paper on Moultonia.

(The plates are taken from photographs by Mr. Robert M. Adam.)

PLATE CXLVI. Moultonia singularis, Balf. fil. et W. W. Sm.
CXLVII. Chirita hamosa, R. Br. Plant in flower in the Royal Botanic Garden, Edin.

connivent sepals
apex of capsule
seeds
sepal
Flora of Sarawak.
Moultonia singularis
Balf. f. et W.W.S.
Type.
Sarawak, 10.2.1914.

MOULTONIA SINGULARIS, BALF. FIL. ET W. W. SMITH.

CHIRITA HAMOSA, R. BR.